

skin diver

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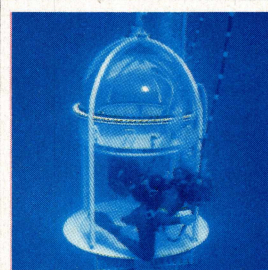
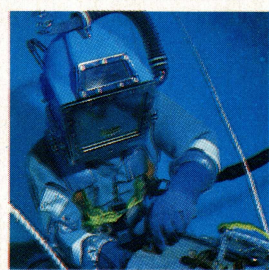
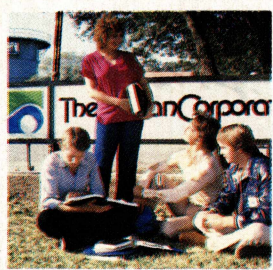
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skin diver

Volume Thirty-three Number Twelve

FEATURES

- | | | | |
|----------------|-----|---------------------------------|---|
| DIVE EQUIPMENT | 28 | AQUACRAFT II | ERIC HANAUER |
| | 41 | OCEAN WATCH FROM PORSCHE DESIGN | JIM WALKER |
| | 45 | CRESSI-SUB SL100R SPEARGUN | FRED FISCHER |
| | 46 | COBRA WETSUITS | MARTY SNYDERMAN |
| | 48 | IMPERIAL'S SUPERLIGHT DRY SUIT | BONNIE J. CARDONE |
| MISCELLANEOUS | 34 | SEASON'S GREETINGS | LINDA L. ROSENDORF
Christmas cards from your underwater photos |
| | 110 | DAN NEEDS YOUR SUPPORT | BONNIE J. CARDONE
Divers Alert Network saves lives |
| PERSONALITIES | 37 | LOUIS PREZELIN | HILLARY HAUSER
On assignment with Cousteau |
| | 108 | 1984 NOGI AWARD WINNERS | JIM WALKER
Underwater Society of America accolades |
| PHOTOGRAPHY | 42 | OCEANIC'S DIGITAL 3000 STROBE | GERI MURPHY |
| | 54 | FUJI 100 COLOR SLIDE FILM | JIM AND CATHY CHURCH |
| DIVE BOATS | 47 | ZODIAC MARK IV | ERIC HANAUER |
| MARINE LIFE | 50 | ICE DIVING FOR SCALLOPS | GREGORY S. STONE
Maine's winter shellfish season |
| | 52 | DANGER IN PARADISE | ALEX KERSTITCH
Collect cone snails carefully |
| LOCAL DIVING | 74 | OLIVER'S TWIST | DEE SCARR
Friendly flounder |
| | 58 | SAN NICOLAS ISLAND | ROB FAZIO
California's virgin diving territory |
| | 61 | FLORIDA SPRINGS DIVE GUIDE | STEVE LUCAS
Clearwater fantasy |
| FOREIGN TRAVEL | 88 | FLORIDA'S CHIPOLA RIVER | ALAN WILLIAMS
A liquid time capsule |
| | 69 | CLASSROOM OF CORAL | JEFFRY H. MARCUS, PH.D.
Live-aboard marine life cruises in the Caribbean |
| | 76 | UNDERWATER EXPLORERS SOCIETY | STEPHEN FRINK
Twenty years in the Bahamas |
| DEPARTMENTS | 92 | SCAPA FLOW | BOB MICHELSON
Underwater fleet off the Orkney Islands |
| | 11 | SCUBA QUIZ | 40 TECHNIFACTS |
| | 14 | WRECK FACTS | 56 FOM |
| | 25 | SHOPPER'S GUIDE | 84 Rx FOR DIVERS |
| | | | 113 SDM INDEX |
| | | | 115 NEW BOOKS |
| | | | 116 DIVER'S DIRECTORY |



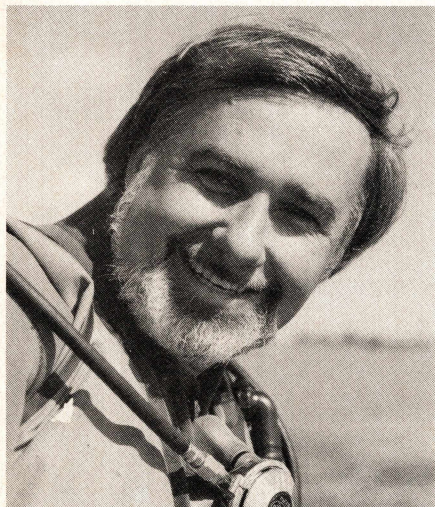
COVER

Photographed with a Nikonos V camera, 15 mm lens and Subsea Mark 100 strobe, using Fujichrome 100 color slide film, this shot of Kathie Mullins at Blossom Rock, Virgin Gorda, USVI covers a wide range of colors and reflectances. For more information on this new film see page 54. Photo/Jim and Cathy Church.

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SDM Editorial

BY THE PUBLISHER



HOT TANKS = TROUBLE

Ever since the first scuba tanks were produced more than 30 years ago, divers have been trying to paint them. The abrasive combination of sun, sand, sea and rocking boats can ruin even the most durable finish. Within months, most tanks show evidence of hard wear. Scratches, gouges, pits and blisters produce an unsightly appearance and many tank owners seek a method of refinishing them. In many tropical resort areas, tanks are repainted twice a year to prevent rusting or other damage to the exterior.

I would guess divers have tried just about every possible paint preparation known to man. Their refinishing attempts span the entire spectrum of hard enamels, fancy lacquer coatings, epoxy paints, vinyl dips and more. Until recently, this preoccupation with tank painting had not been much of a problem. Unfortunately, new technologies in one industry can sometimes create serious problems for another. This happened several times in the world of diving.

Two Florida divers felt the need to repaint three aluminum scuba tanks. They took their tanks to a powder paint company which specialized in a new process for achieving a durable paint coating.

First, the tanks were sandblasted to remove all traces of the original factory paint job. Next, the tanks were painted by a special process using a metallic powdered paint. Finally, the three tanks were placed into an oven and cured at a high temperature. The divers were not familiar with the bake-on procedure and the paint company knew nothing about scuba

tanks and the tremendous pressures involved. The paint company had never treated any scuba tanks before.

Sometime after the refinishing was completed, one of the two Florida divers took his newly painted tank to a dive shop for filling. It exploded before reaching the designated working pressure and injured five people who happened to be in the dive store at the time. The employee filling the tank suffered a broken arm and other injuries, but luckily survived the experience. The blast ripped through the side wall of the dive store and shattered the front window. The store's interior was a shambles.

Four days later, the other Florida diver took his two tanks into another dive shop for tank inspection and filling. The first of these two tanks also exploded while being filled. The dive store owner lost both his legs in the accident. Needless to say, this dive store was also demolished.

These two tragic scuba tank accidents in less than one week caused shock waves throughout the dive industry. Dive equipment manufacturers and distributors suddenly focused their attention on an entirely new hazard which never before existed. This was the first time that scuba tanks had exploded as a result of a paint job!

What exactly happened in the case of these two explosions? Very simply, the paint curing process used for the refinishing had reduced the tensile strength of the scuba tanks involved. When this aluminum alloy is heated to temperatures in excess of 400°, the metallurgical struc-

ture is altered. While these heat-damaged scuba tanks may have appeared perfect they were no longer the same sturdy pressure vessels they were prior to the painting process.

As a result of investigations and studies of the damaged tanks involved, both the Dacor Corporation and U.S. Divers Company issued warning bulletins to dive stores, dive resort operators and all scuba instructor associations. These companies warned divers not to use paint or refinishing processes which involve high temperatures for curing or baking. They also recommended that compressor operators be careful of freshly painted tanks, and verify that a hydrostatic test was completed after the new paint job. The warnings apply to *all* dive cylinders.

Any aluminum scuba tank which has been subjected to any sort of action by fire should not be used. If there is any question about the degree of heat or damage involved, a hydrostatic test should be conducted prior to filling.

If you have a scuba tank which you suspect has been subjected to any painting process that involved a high temperature, have it hydrostatically tested before filling or further use. If you are planning to have your scuba tank repainted, be sure that no heat is applied to the tank. If you are in doubt about the paint process you intend to use, discuss the matter with your local dive shop owner or contact the cylinder manufacturer. Tampering with a scuba tank, and its finish, can be a shattering experience for the tank and its owner. 

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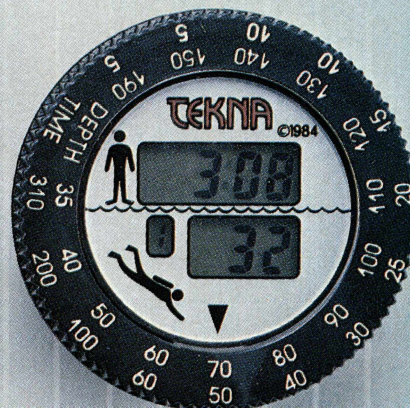
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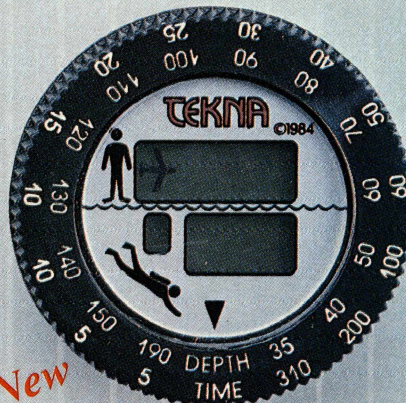
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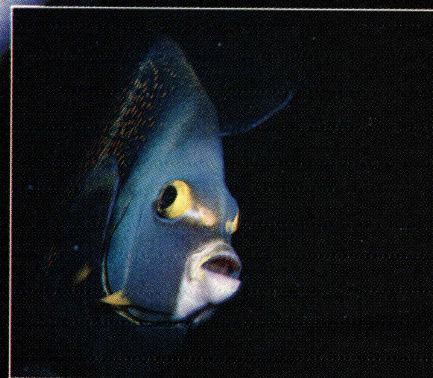
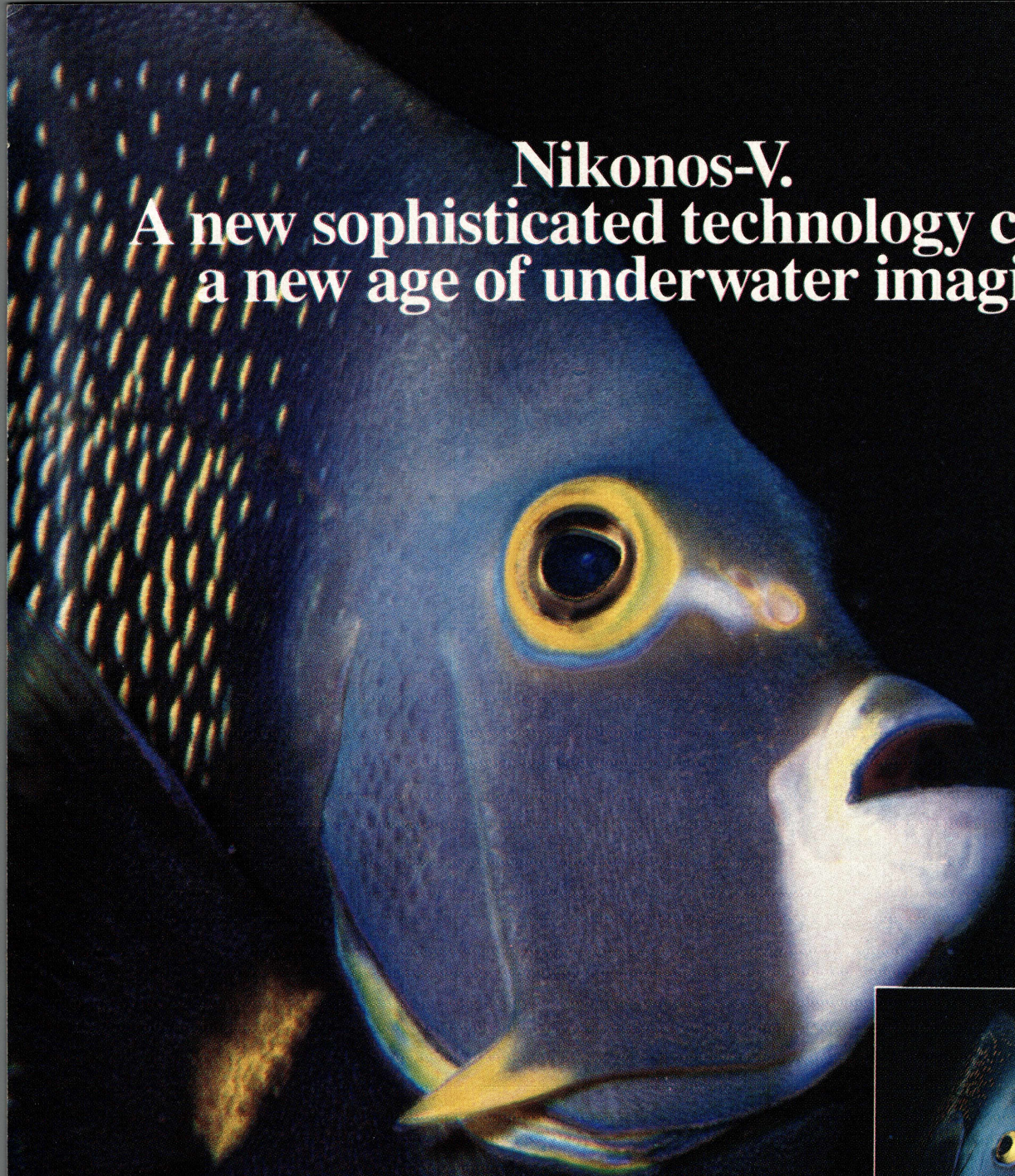
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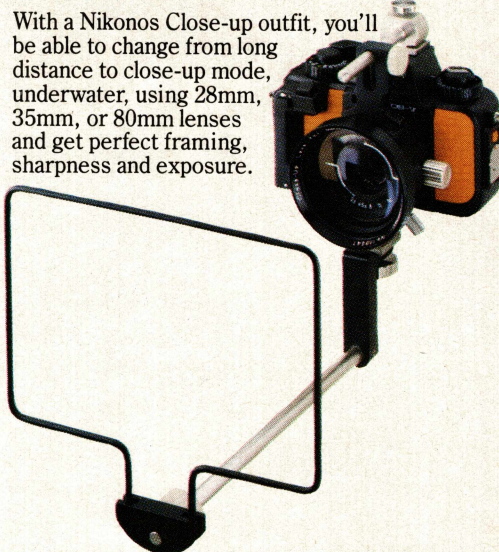
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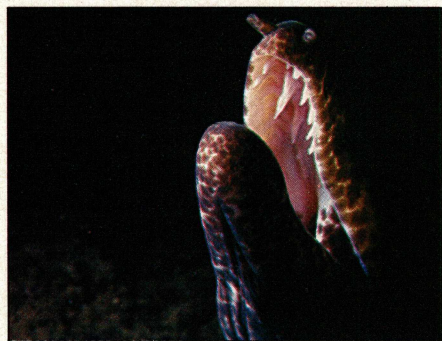
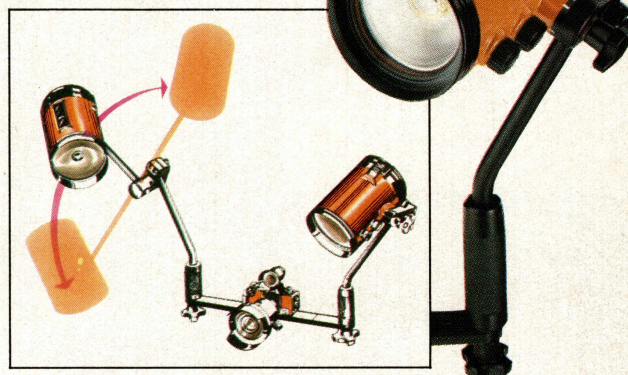
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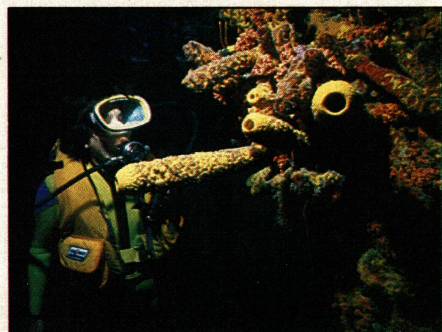
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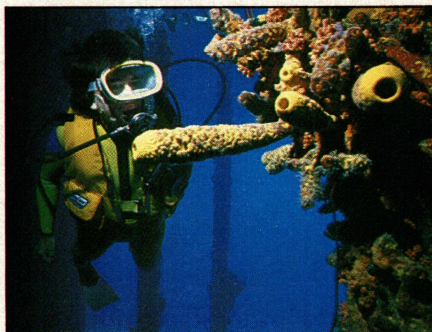
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Scuba Quiz

Category: Scuba Tanks

By Dennis Graver

Without some means to store compressed air, scuba diving as we know it wouldn't be possible. You know that scuba tanks store air for us to breathe underwater and that the tanks require some maintenance to ensure safety, but do you know all you need to know regarding these high pressure containers? Find out with this month's quiz. The answers are on the following page. Note: Select the most correct answer to each of the questions.

1. A standard steel tank can be filled to a maximum safe pressure of _____ which provides a volume of _____ cubic feet of air.

- ☐ A. 2,250; 71.2
- ☐ B. 2,250; 64.7
- ☐ C. 2,475; 64.7
- ☐ D. 2,475; 71.2

2. A tank should not be completely emptied of air because:

- ☐ A. The metal structure of the tank will be weakened
- ☐ B. Insects can enter the tank
- ☐ C. Moisture can enter the tank
- ☐ D. Dust can enter the tank

3. A compressed air cylinder should be internally inspected each _____ and pressure tested each _____.

- ☐ A. Year; 3 years
- ☐ B. Year; 5 years
- ☐ C. 5 years; year
- ☐ D. Year; year

4. A 2,250 psi rated tank is hydrostatically tested at a pressure of _____ psi.

- ☐ A. 2,250
- ☐ B. 2,475
- ☐ C. 3,500
- ☐ D. 3,750

5. Regular gross overfilling of air cylinders will result in:

- ☐ A. Metal fatigue
- ☐ B. Moisture formation within the tank
- ☐ C. Valve damage
- ☐ D. A stiff fine from the Dept. of Transportation

6. A standard steel scuba tank, when filled to capacity, will increase in pressure approximately _____ psi for each one degree Fahrenheit the temperature inside increases.

- ☐ A. 1
- ☐ B. 5
- ☐ C. 6
- ☐ D. 7

7. The best range of pressures for storing a scuba cylinder is:

- ☐ A. 100 - 300 psi
- ☐ B. 500 - 1,000 psi
- ☐ C. 2,000 - 3,000 psi
- ☐ D. Empty

8. True or False: Aluminum tanks, which do not rust, require no maintenance except for pressure testing.

- ☐ A. True
- ☐ B. False

9. The difference in weight between a full and an empty 80 cubic foot scuba tank is approximately _____ pounds.

- ☐ A. 3
- ☐ B. 5
- ☐ C. 6
- ☐ D. 8

10. If an aluminum tank contains 80 cubic feet of air at 3,000 psi and a temperature of 70°F, how much air will be in the tank at the same temperature and a pressure of 1,869 psi?

- ☐ A. 71.20 cu. ft.
- ☐ B. 64.73 cu. ft.
- ☐ C. 49.98 cu. ft.
- ☐ D. 49.84 cu. ft.

Scuba Quiz

Answers: Scuba Tanks

1. D. 2,475; 71.2. A new steel tank can have a + sign following the date of manufacture. This allows the tank to be filled 10 percent over its rated working pressure, which, in the case of steel tanks, is 2,250 psi. A 71.2 cu. ft. tank only contains that volume when the tank has been filled to the highest allowable pressure—2,475 psi. At 2,250 psi, a standard steel tank holds less than 65 cu. ft. of air. It is not likely that the + sign will remain on the tank after its first five years, so be aware of the difference in available air.

2. C. Moisture can enter the tank. If a tank is emptied completely in the water, it is possible for water to get into the tank through the regulator. If a tank is left standing with its valve open out of the water, temperature changes can cause the tank to expand and contract and to "breathe in" moist air. Moisture in the tank causes corrosion and must be avoided. Don't drain a tank dry during use.

3. B. Year; 5 years. Most dive stores require an internal visual inspection of a tank at least once a year. Some require one if the tank is completely empty. Tanks with heavy usage should be inspected every six months. Hydrostatic testing is a federal regulation and must be done at least every five years. It should be done any time you suspect that your tank may have been damaged or weakened.

4. D. 3,750. Tanks are tested at five-thirds of their rated pressure. In this instance, the rated pressure is 2,250 psi, so 5/3 times 2,250 is 3,750 psi. Alumi-

num cylinders, rated at 3,000 psi, are tested at a pressure of 5,000 psi. This is applied hydraulically using water rather than air. This prevents an explosion in case the tank fails under the increased test load.

5. A. Metal fatigue. Although your tanks are tested to pressure much higher than their working pressure, it is a mistake to overfill them. The metal expands with each filling. Repeated overfilling stresses the metal and causes it to become brittle. This will greatly decrease the life of the tank, probably causing it to fail its next hydrostatic testing. For safety and practicality, only fill tanks to their working pressure.

6. B. 5. A rule of thumb for a steel tank filled to 2,475 psi is that the pressure will increase 5 psi per degree of temperature change inside the tank. For example, if a tank were filled at 70°F and left in the trunk of a car where the temperature reached 140°F, the pressure inside the tank would increase by about 350 psi (70 x 5). This isn't good for a tank or on the burst disc in the tank valve. The pressure increase in an aluminum tank is about 6 psi per degree F.

7. A. 100 - 300 psi. Tanks should not be stored empty as noted, nor should they be stored filled. The more air there is in a tank, the more corrosion can take place if moisture is present. There is also a potential problem if the tank contains 500-1,000 psi during storage. In a fire, the heat may affect

the metal of an aluminum tank and cause it to explode before the pressure becomes great enough to rupture the burst disc. The safest storage pressure is low, but not 0 psi.

8. B. False. Aluminum tanks do corrode, although their corrosion is an oxidizing process that arrests itself while steel oxidizes in a way that accelerates the process. Internal inspection is still required in aluminum tanks, however, and the valves must be removed periodically to prevent them from seizing to the neck of the tank.

9. C. 6 pounds. Air at sea level weighs approximately .08 pounds per cu. ft., so 80 cu. ft. of air weighs about 6.4 pounds. It is good to know this so you can understand that your buoyancy will change by this amount as you use the air from your tank during a dive. If you are not wearing a wetsuit, you will want to weight yourself so you are neutrally buoyant when low on air so you will not have to fight to stay down at the end of a dive.

10. C. 49.98 cu. ft. The formula to find the volume for a change in pressure in a tank is $P_1/V_1 = P_2/V_2$ at a constant temperature (P = Pressure and V = Volume). Absolute pressures must be used, so 14.7 psi must be added to the pressures in the equation. Substituting, we find that $3,000 + 14.7/1,869 + 14.7 = 80/X$ or $3,014.7/1,883.7 = 80/X$. This works out to $3,014.7X = 150,696$, so $X = 49.98$ cu. ft. If you forget to convert the pressures to absolute, your answer will be 49.84—close, but not quite correct.

The use of scuba cylinders is regulated by the Department of Transportation. They are very safe containers if used, inspected and tested according to the regulations of the DOT and the diving industry. Scuba tanks can be extremely dangerous, however, if abused. Know what makes tanks dangerous, such as heating an aluminum tank to more than 240°F and avoid practices which can reduce the strength of your cylinder. I hope you did well on the quiz and that you understand some of the practical aspects involved in the use of scuba tanks. They allow us to have a great time, don't they?

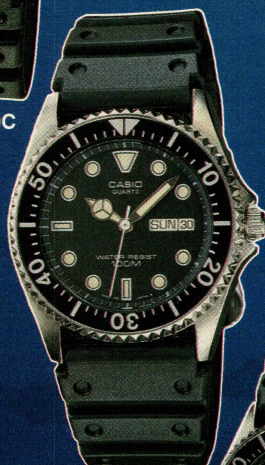
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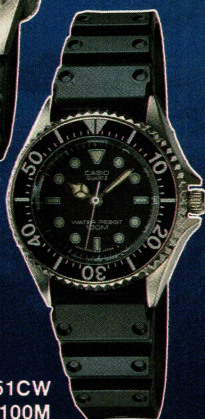
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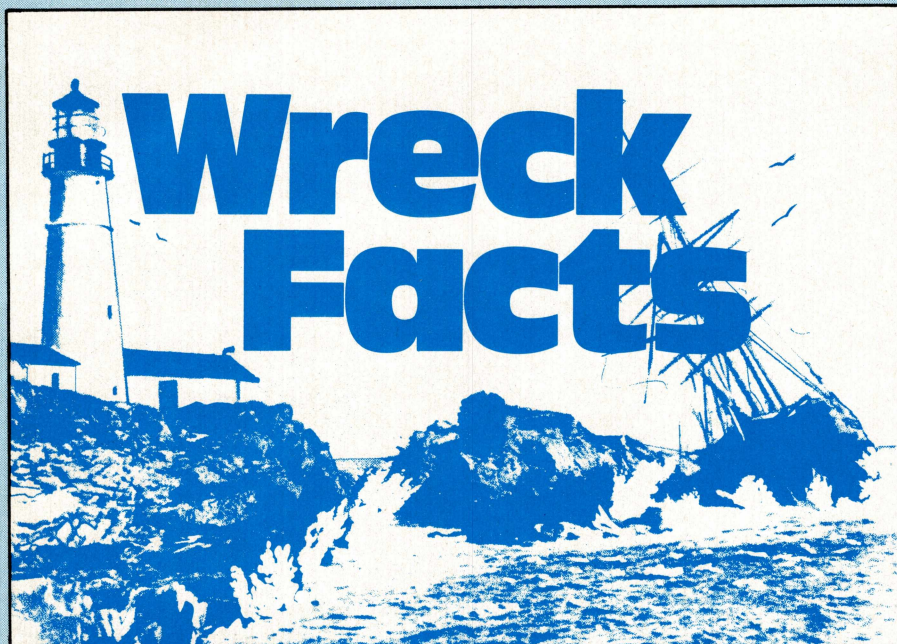


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BY ELLSWORTH BOYD

Edward Michaud, president of M and K Research and Recovery, has filed a claim on the legendary shipwreck, *Sindia*, buried beneath the sand and surf off Ocean City, New Jersey. Although some of its cargo was salvaged in 1901 when the 329 foot, four-masted bark was grounded in a severe storm, divers believe there is a wealth of valuable artifacts still aboard the ship.

The *Sindia* lies at a 45 degree list to port, her hull completely covered with sand. Only the vessel's tiller and a small part of her bow are exposed. At low tide, two feet of water flows over the 3,068 ton wreck. She is entombed at the foot of 16th and 17th streets, only 300 feet from Ocean City's famous boardwalk.

Ed Michaud says, "The manifest goods on the *Sindia* are truly unique. She carried oriental porcelain, cloisonne (colored enamelwork separated by thin metal bands), bronze urns and vases, carved ivory, jade and stone from China, plus other curios. Our project, started last spring, is expected to last at least a year, maybe more. We are sort of an added attraction for Ocean City tourists. I don't believe that a treasure trove has ever been attempted so close to public view."

Michaud and his buddies researched the *Sindia* thoroughly before they filed a claim. They corresponded with maritime experts in London and Shanghai as well as visiting local and national archives in the United States. Sailing from Japan to New York, the *Sindia's* cargo was insured for \$500,000. The owners estimated the cargo was worth over \$1 million because all 12 cargo holds were filled to the brim and each article was listed on the ship's manifest.

I received letters from two other New Jersey divers and I would appreciate

reader input on them. Captain Lew Panetta asks about two very old schooners. One, carrying a load of tar, was supposed to have been lost in the late 1700s off Brigantine, New Jersey and the other—a wooden schooner—foundered off Hogate. I was able to locate a brief description of the latter wreck in the book, *Shipwrecks off the New Jersey Coast*, but no names or details were listed. If you have information on either of these wrecks contact Lew at: 528 Rowand Avenue, Glendora, NJ 08029.

Arthur Bink, 609 Hamilton Drive, Cinnaminon, NJ 08077, is in search of a sunken dirigible called the *Akron*. Arthur says: "I'm a dirigible historian, a member of numerous lighter than air societies and have 28 pieces of the Hindenburg. Do you know the location of the airship *Akron*? I have conflicting reports of 22 miles southeast of Barnegat Light, while others say 29 miles. Depths range from 50 to 80 feet. Although the *Akron* crashed in 1933, there may be some engine parts, dishes from the galley and other artifacts remaining." If divers know anything about the *Akron*, please contact Arthur.

Tim Blake, Pineyville, Louisiana, asks for information on wrecks off the coasts of Mississippi and Louisiana. The first thing I would do, Tim, is check with the dive shops in Hattiesburg, MS and DeRidder, LA. Then write to the Louisiana Division of Federal Records in Baton Rouge. They have letters, passenger lists and marine casualty data from many wrecks. Some of this material was shipped to Louisiana State University so you might try there, too. Since some wrecks off these coasts were steamships, write to: Curator, Steamship Historical Society of America, 414 Pelton Avenue, Staten Island, New York 44089.

Another great resource, Tim, is Bubba Hoover, 1001 University Court, Hammond, LA 70401. Since 1965 Hoover has been diving Lake Maurepas, Louisiana and a dozen other rivers, creeks and bayous. He has uncovered Indian artifacts from 500 B.C., cannonballs from the War of 1812 and many Civil War artifacts. One of his recent finds was the USS *Barataria*, a 125 foot long ironclad stern-wheel gunboat burned in Lake Maurepas in 1863 to prevent its capture by Confederate soldiers. Within a week of that find, Hoover and fellow divers discovered the Civil War schooner, *James Stockton*, captured and scuttled by Confederate troops in the Blood River. Hoover says he and his team are uncovering information that provides insights to the growth, development and settlement patterns in regions around various waterways. They are gathering valuable architectural information from these sunken ships as well. Written instructions were seldom used in pre-20th century shipbuilding.

Doyle Northrop, Keene, Texas has started researching wrecks off the coast of the Lone Star State. He has found a few locations of ships that sank where the Rio Grande feeds into the Gulf of Mexico and a couple in the Padre Island area. Doyle, you might contact Wade Holloway, P.O. Box 1467, Bay City, TX 77414. Wade has a special interest in the wreck of the *Pisano* and others in the area. Also, *Shipwrecks in the Americas* by Robert F. Marx, is a good reference for old Texas wrecks. Divers with more information may contact Doyle at: 10 Ray Street, Keene, TX 76059.

Al Dobler, Wheeling, West Virginia read *Graveyard of the Atlantic* and planned a trip to North Carolina's outer banks. He wants specific locations of wrecks in the area. Al, the man who knows as much as anybody about those wrecks is Bill Lovin, P.O. Box 2242, Chapel Hill, NC 27514. You could also check with Mike Weiner about wreck charts. Mike's address is: 11 Creek Bend Drive, Fairport, NY 14450. There is a book that has details too: *A Guide to Sunken Ships in American Waters* by Kaplan and Lonsdale. It's out of print, therefore you'll have to find it in a library or a marine museum.

California divers will be pleased to learn that two books are now available: *Shipwrecks of the Pacific Coast* and *Pacific Graveyard*, both by James A. Gibbs. They may be ordered from: Binford and Mort Publishing Company, P.O. Box 42368, Portland, OR 97242. Write for a price list and ask for a brochure on other maritime books.

Former Navy diver, Dick Geyer, Springdale, Pennsylvania has just released his book: *Wreck Diving—A Guide for Sport Divers*. The book is written so that a novice diver may learn the basics of making a safe wreck dive using the proper equipment and correct techniques. Geyer's material is presented in

a format compatible with NAUI, PADI and YMCA instructional courses in wreck diving. This enables instructors to use the text as a teaching guide. It is available from: New Century Publishers, 220 Old New Brunswick Road, CN 1332, Piscataway, NJ 08854.

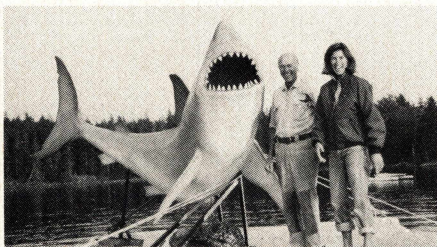
Although it's not directly related to wreck diving, a new book: *Oil Field Diving—The Diver's Story* by Norman Jacobsen, offers practical information on saturation diving in very deep waters. Shipwreck expeditions such as the *Andrea Doria* and *Republic* employ commercial sat divers and Jacobsen captures the true grit of this exciting breed of deep diver. The book may be ordered from: Jacobsen Properties, P.O. Box 96, Westwego, LA 70094.

Klaus Lindemann, author of *Hailstorm Over Truk Lagoon*, writes from Germany: "I have just returned from another exciting trip to Truk Lagoon where we documented the holds of the *Hoki Maru*. This had never been done before because divers kept encountering seeping aviation gasoline that stings the skin. We avoided this by wearing full wetsuits and discovered four caterpillars, seven trucks and one tractor, all very well preserved. In the hold of another vessel, the *San Francisco Maru*, we documented gasoline drums, aerial bombs, shells, torpedoes and depth charges. We wonder why this ship didn't blow sky high! We found a new wreck, the *Yubae Maru*, 3,800 tons, resting on its port side and still another—a beautifully preserved fishing trawler. Visibility on all wrecks was over 100 feet." For information on Truk Lagoon, divers may write to Lindemann at: Leuschnerstr 34, 67 Ludwigshafen, Germany.

That's all for this month. Send your questions to: Ellsworth Boyd, Rt. 2, Box 408, 1120 Bernoudy Rd., White Hall, MD 21161. Please include a stamped, self-addressed envelope. 🐬

LAND SHARK

When Stan Waterman and his wife Susan returned to their home in Sargentville, Maine recently they were shocked to find a 15 foot great white shark waiting for them atop a stone piling. As it turned



out, the shark was a 300 pound fiberglass replica, placed there as a practical joke by the Watermans' good friend Susie Cochran. The joke was quite appropriate as Waterman often films such creatures underwater. 🐬

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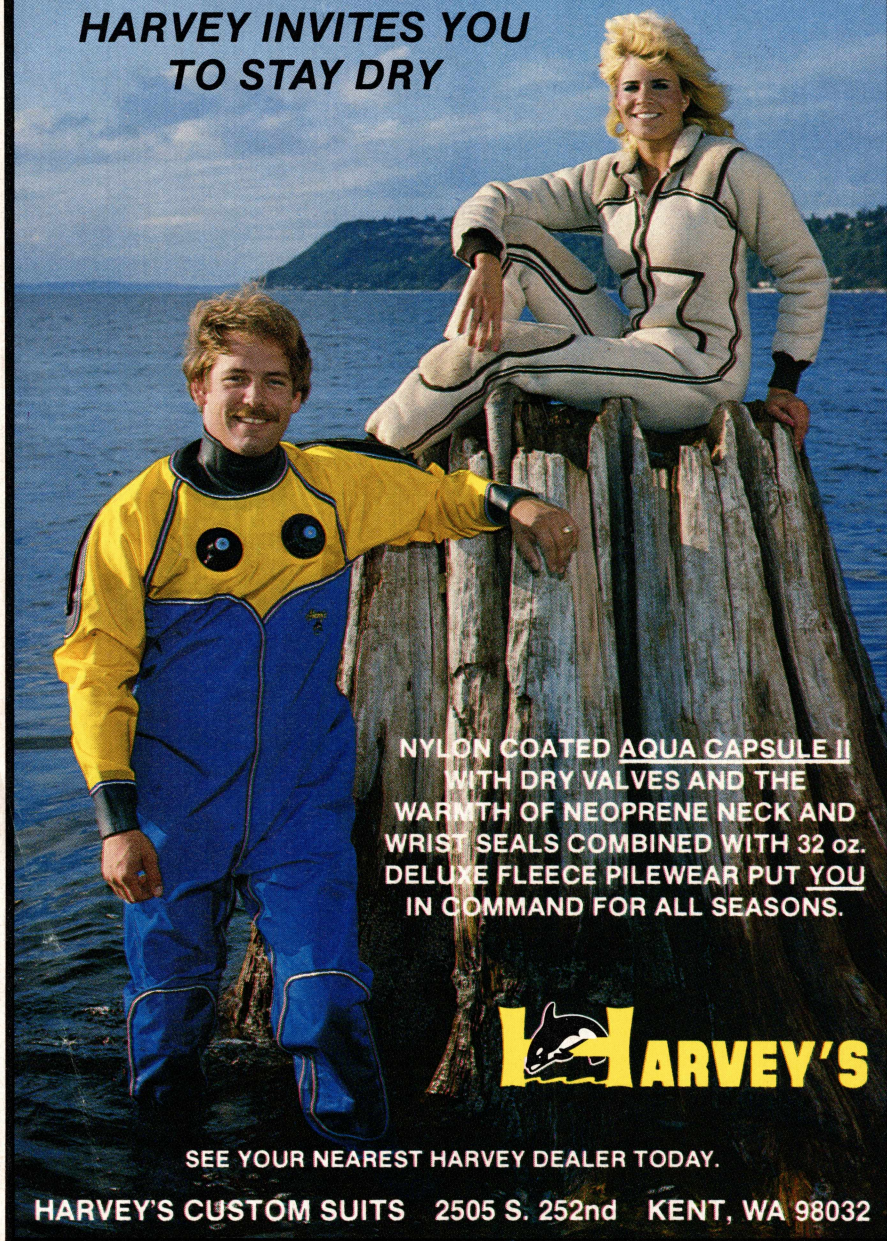


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The Our World-Underwater Award is presented each year during the Our World-Underwater Film Festival to a person whose dedication and accomplishments have contributed to the exploration of the sea and promotion of sport diving.

This year's winner, the president and founder of Dacor, Sam Davison, first saw



the underwater world through a pair of crude Japanese goggles in the waters off Guam while he was serving in the U.S. Marine Corps during World War II. A graduate of business school, he had his second view of the underwater world while attending the University of Miami in 1948 and went scuba diving for the first time in 1950 in the Caribbean. Immediately recognizing this new sport as an industry with great future growth potential, he decided to become a manufacturer of diving equipment in 1954. His first product, a regulator, was produced on his kitchen table in Evanston, IL. Like all members of the Dacor team, Sam is a very active diver, engaging in his favorite sport in waters all over the world.

HANDICAPPED SCHOLARSHIPS

A new program of scholarships for handicapped people wishing to learn scuba diving is being offered by The Dive Shop in Tucson, AZ. The Dive Shop scholarship covers all course fees. Telephone David Rabb at (602) 795-9878 or 884-0603 for more information.

DECOMPRESSION WORKBOOK

Written by George S. Lewbel, Ph.D., *The Decompression Workbook* is a "cookbook" of procedures, principles and concepts dealing with decompression. Brought together in an easily followed sequence, the book covers single and multi-dive problems and treats errors such as fast or interrupted ascents, omitted or emergency decompression, cold or strenuous dives, high altitudes and flying after diving. The procedures are taken directly from the NOAA and U.S. Navy dive manuals.

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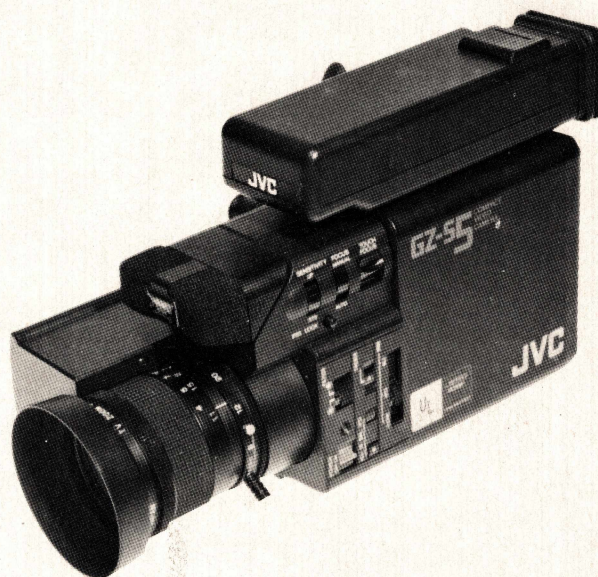
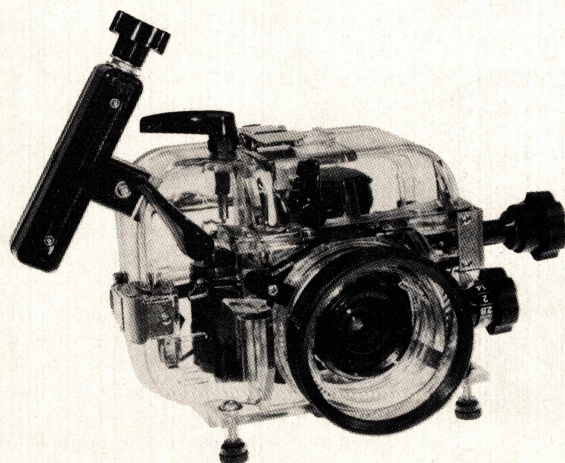
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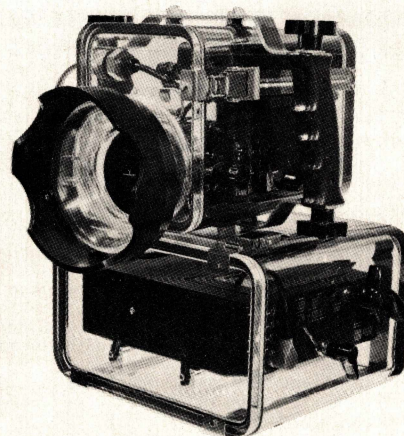
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"Capture the Sea" by creating your own video dive log with the Ikelite Marine Video System. Designed around the JVC GZ-S3 and GZ-S5 color video cameras and the HR-C3 Compact Video Recorder, this small yet remarkably powerful system lets you enjoy the excitement of creating your own underwater video productions. These JVC cameras produce better than 270 lines of resolution with an impressive signal to noise ratio of 45 db. The results are clear, sharp pictures with low image lag.

The accessories available for this system make it the number one choice for divers everywhere. The 3 inch JVC TM-P3 Color Monitor is powered by either AC or DC, and is ideal for the travelling diver.

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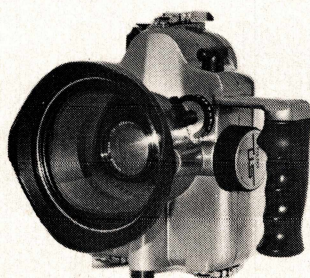
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BENEATH THE SEA PHOTO CONTEST

January 31 is the deadline for entries in the Beneath the Sea Underwater Photography Competition. Winners will be honored March 16 at Beneath the Sea, the 9th Annual Greater-New York Underwater Symposium and Film Festival in Tarrytown, New York.

Open to amateur underwater photographers in New England and mid-Atlantic states, the contest offers many valuable prizes and awards. The best in show photo will receive a Bonaire diving package for two, including transport from Miami on ALM Antillean Airlines and a week at Cap'n Don's Habitat.

Slides or prints may be entered in several categories, including normal/wide angle, macro, northern salt or freshwater and 110 format.

Entry forms for the contest may be obtained by sending a self-addressed, stamped envelope to BTS Photo Contest, P.O. Box 644, Rye, NY 10580. 

NAUI SPONSORS WRECK

The Dade County Artificial Reef Program in Miami, Florida has sunk a new wreck called the *Proteus*. It was sponsored by the NAUI Diving Association through a fund raising drive initiated by the NAUI South Atlantic Branch and headed by instructor Valerie Rutledge.

The new wreck is ideally suited for diving. It is 220 feet long and easily accessible in 80 feet of water. As time passes, it will become a magnet for local marine life and a popular diving spot. 

TEKNA PEOPLE

Don Abbott has accepted the position of national sales manager for Tekna. His previous experience includes sales management with Spalding Sporting Goods.

Julie Johnson has joined Tekna as export sales manager. A former Our World-Underwater scholarship winner, she was previously assistant to the president at Helix Ltd.

Gary Surgeon has accepted the position of regional sales manager for the Rocky Mountain, North Central and Great Lakes states.

Russ Gordon is the new regional sales manager. He will be handling the Mid-eastern and Southern states.

Dick Loren has accepted the position of customer service manager. He was previously customer service manager at Cambell Industrial and has had previous customer service experience with Westinghouse. Brett Owen has accepted the position of regional sales manager for the East Coast. His previous experience includes sales at Helix Ltd. 

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Addeo Jewelers
Casselberry: Bond Jewelers
Charlotte: Bijoux Jewelers
Clearwater: Double "O" Jewelers
Gayfers Fine Jewelry
Rose Jewelers
Cocoa Beach: Ron Jon Surf Shop
Coral Gables: Balough's of Coral Gables
Jae's Jewelers
Snow's Jewelers
Coral Springs: Coral Springs Jewelers
Daytona Beach: Bill Green Jewelers
Deerfield Beach: Raymond Lee Jewelers
Dunedin: Hunter Jewelers
Eustis: Garner Jewelers
Ft. Lauderdale: The Jewelry Factory
Squire International
Jewelers

Ft. Myers: College Jewelers
Jacobs Fine Jewelers
Ft. Walton Beach: Jack West Jewelers
Gainesville: The Gold Standard
Hallandale: Diplomat Jewelry
Homestead: Ferguson Jewelers
Islamorada: Irene & George's Dept.
Store
Jacksonville: Aquifer Dive Center, Inc.
Barnett Jewelers
Berthet Jewelers
Cadoura's Imported
Jewelry
Classic Jewelers &
Designers
Furchgott's Fine
Jewelry Dept.
G & R Jewelers
Matheny's Aquatics
Unlimited
May Cohens Fine
Jewelry Dept.
Moon & Star Jewelers
Mr. D's Gallery
Underwood Jewelers
Roy Ward Jewelers
Custom Jewelers, Inc.
Garner Jewelers
Kew Gardens Jewelers

Lake City:
Largo:
Leesburg:
Margate:

FLORIDA

Mary Esther:
Melbourne: Carlyle & Co.
Jacobs Fine Jewelers
Sullivan S & S Jewelers
Younique Jewelers
Miami: Buchwald Seybold
Jewelers
International Jewelers
Isis Joyeria
London Watch Co.
Mercy Professional
Apothecary
Moray's Jewelers
Original Rubin's Jewelers
Peoples Jewelers
Rainbow Jewelry
J. B. Robinsons
Santayana Jewelers
Sorren, Inc.
Suniland Jewelers
Naples: Bruce Vernon Jewelers
Kay Jewelers
Naples Jewelers
Lou Bert Jewelry
North Miami:
North Miami
Beach: Busch Jewelers
Possessions Fine Jewelry
Victor's Jewelers
Bachman Jewelers
Hill's Jewelers
Master Jewelers
Ormond Beach: Wm. Thames & Co.
Jewelers
Clock Gallery
Carlyle & Co.
Diver's Den
Gayfers Fine Jewelry
Personal Touch Jewelers
Panama City Dive Center
Pensacola: Carlyle & Co.
The Diamond House
Elebash Jewelry Co.
Jewelers Trade Shop
Meadows Jewelers
Wells Jewelers
Perry: Carlyle & Co.
Pinellas Park: Tackle Shack, Inc.
Harbor Jewelers
Pompano Beach: Jewelry For You
Bijoux Jewelers
Port Richey: The Queen's Jeweler
Port Salerno: Padgett's Jewelry
Quincy: The Jewel Box
Riviera Beach: Sea Pro Scuba Center
St. Augustine: Nettle's Jewelry
St. Petersburg: Bond Jewelers
Gilbert Jewelers
Kay Jewelers
Lawton's Jewelers
Bruce Watters Jewelers
Stanley Jewelers
St. Petersburg
Beach: Lou Bader, Ltd. Fine
Jewelers
Sarasota: Carlyle & Co.
Kay Jewelers
Phillips Jewelers
Bond Jewelers
The Queen's Jeweler
Moon's
Stuart: Stafford Jewelers
Tallahassee: Fischer Diamond Jewelry
Tamarac: Aaron Jewelers
Tampa: Capri Jewelry
Dan-Lo
Hayman Jewelers
Jacobs Jewelers
Kay Jewelers
Alvin Magnon
Raquel's
Richmond Time Service
Stanley Jewelers
Time After Time
Topaz Jewelers
Whitefire Ltd.
Bond Jewelers
Venice: Deep Six Dive Shop
Vero Beach: Jacobs Fine Jewelers
West Palm Beach: Marcus Jewelers
Michael's Jewelers
Jacobs Fine Jewelers
Gateway Jewelers
Right Time
Winter Haven:
Winter Park:

GEORGIA

Albany:
Atlanta: Gayfers
Bailey, Banks & Biddle
F & G Jewelers
It's About Time
Lenox Time
Taber's Jewelers
Randy's Jewelry & Repair
Center
Brunswick: Rogers Brumit Jewelers
Gayfers
Columbus: Herbs Jewelers
Fletcher's Jewelers
Westbrook Jewelers
Fayetteville: Fayette Jewelers
Forest Park: Robert's Jewelers
Gainesville: Gem Jewelry Co.
Glennville: Loyd Farmer Jewelry
Hinesville: Leroy's Department Store
Jesup: Flowers Jewelers
Lavonia: Andrews Jewelers
Macon: Olde & Gold
Outdoor Adventures
Unlimited
Sharp & Sharp Jewelers
Starr Bright Jewelers, Inc.
Marietta: Atkins Jewelry
Evan's Jewelers
J. Morgan's Fine Jewelry
& Gifts
Rome: Greenes Jewelers
Roswell: L & L Cousineau Jewelers
Stefan Jewelers
Chadwicks
Jewelry by Tajer
Red Anderson Jewelers
Friedman's
Levy Jewelers
Taber's Jewelers
Barr Jewelers
Horace Stephenson
Jewelers
Reavis E. Dixon Jewelers
Evan's Jewel Box
McDonough:
Marietta:
Peachtree City:
Rome:
Roswell:
St. Simons:
Sandy Springs:
Savannah:
Union City:
Valdosta:
Waycross:
Winder:

NORTH CAROLINA

Available At Most: Reeds Jewelers
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Allens Jewelers
Johnson's Jewelers of Cary
Ivey's Department Store
D. Phillips Diamonds
Forrest Jewelers, Inc.
The Gold Man
D. Phillips Diamonds
Floyd G. Robinson
Jewelers
Windy City Jewelers
Spence Jewelers
Tucker Jewelers
Colberts Jewelers
Jewelry Nest
R. Bowman Jewelers
The Dare Shop
Kay Jewelers
Kelly's Diamonds
Unlimited
Tripp Jewelry
Wooten Jewelers
Washington Jewelers
Belk-Berry Fine Jewelry
John Ingle Jewelers
Albert F. Rhodes
Towne Jewelers
Belhaven:
Cary:
Charlotte:
Durham:
Gastonia:
Greenville:
Hickory:
Kinston:
Monroe:
Morehead City:
Morganton:
Nags Head:
New Bern:
Sanford:
Shalotte:
Statesville:
Washington:
Wilmington:
Winston-Salem:

SOUTH CAROLINA

Available At Most: Friedman's Jewelers
Reeds Jewelers
Beaufort: Fox Jewelers
Modern Jewelers
Charleston: Jessica's Gems
The Jewelry Factory
Columbia: David's Fine Jewelry
Dems House of Diamonds
King's Jewelers
Moseley's Diamond
Showcase
Turner's Jewelers
Darden's Jewelers
Martin's Jewelers
The Jewelry Outlet
Turner's Jewelers
Easley:
Georgetown:
Hartsville:
Myrtle Beach:
Seneca:

DIT TUITION/SAFETY

Tuition fees for Divers Institute of Technology's six month Professional Deep Sea Diving Course will be increased by approximately eight percent with the February 11, 1985 class. Prospective students, however, may take advantage of a special offer by submitting their enrollment applications early. Any application (for any future class) received with a postmark dated on or before January 7, 1985 will be honored at the old rate.

In 1984, its 17th year, DIT graduated nearly 2,000 regular students. In addition, there were several hundred special diving safety course students sponsored by OSHA, the U.S. Army Corps of Engineers, the U.S. Coast Guard and other agencies. A total of over 1,262,000 hours of training were logged and of that number nearly 900,000 hours were water-related activities. There were no accidents, incidents or injuries of any significance.

According to John Manlove, DIT director, employment opportunities for today's commercial diving school graduates are excellent and not only in the offshore oil industry. Graduates are called upon to use their skills in other industries involving construction, repair, salvage, inspection and rescue operations. Commercial diving has also become an increasingly important service available to chemical manufacturers, refineries and industrial plants. In addition, there are many employment opportunities in diving related jobs such as hyperbaric and medical technicians, professional tenders, scuba instructors, seismic surveying, tool design and testing, and gas rack operation. Also, there is a demand today for commercial divers who possess a medical, electronics, or engineering background.

Manlove added, "In the last 15 years we have conducted a follow-up employment survey of our graduates and historically, we have received responses from approximately 80 percent of our total graduates. Of those who respond, 85 to 88 percent report they are working in the field for which they were trained...."

NAUI CERTIFICATIONS UP

NAUI's 1984 certifications showed a 40 percent increase in new instructors, compared to the same period in 1983. And, while NAUI's basic level certifications are up 9.6 percent over a year ago, its open water certifications are up 44.5 percent over 1983.

DIVER'S ALMANAC

The address and price given for the *Diver's Almanac* in the New Book section of the October SDM were incorrect. The book is available from Diver's Almanac, 879 Spring St., Medford, OR 97504 for \$14.95.

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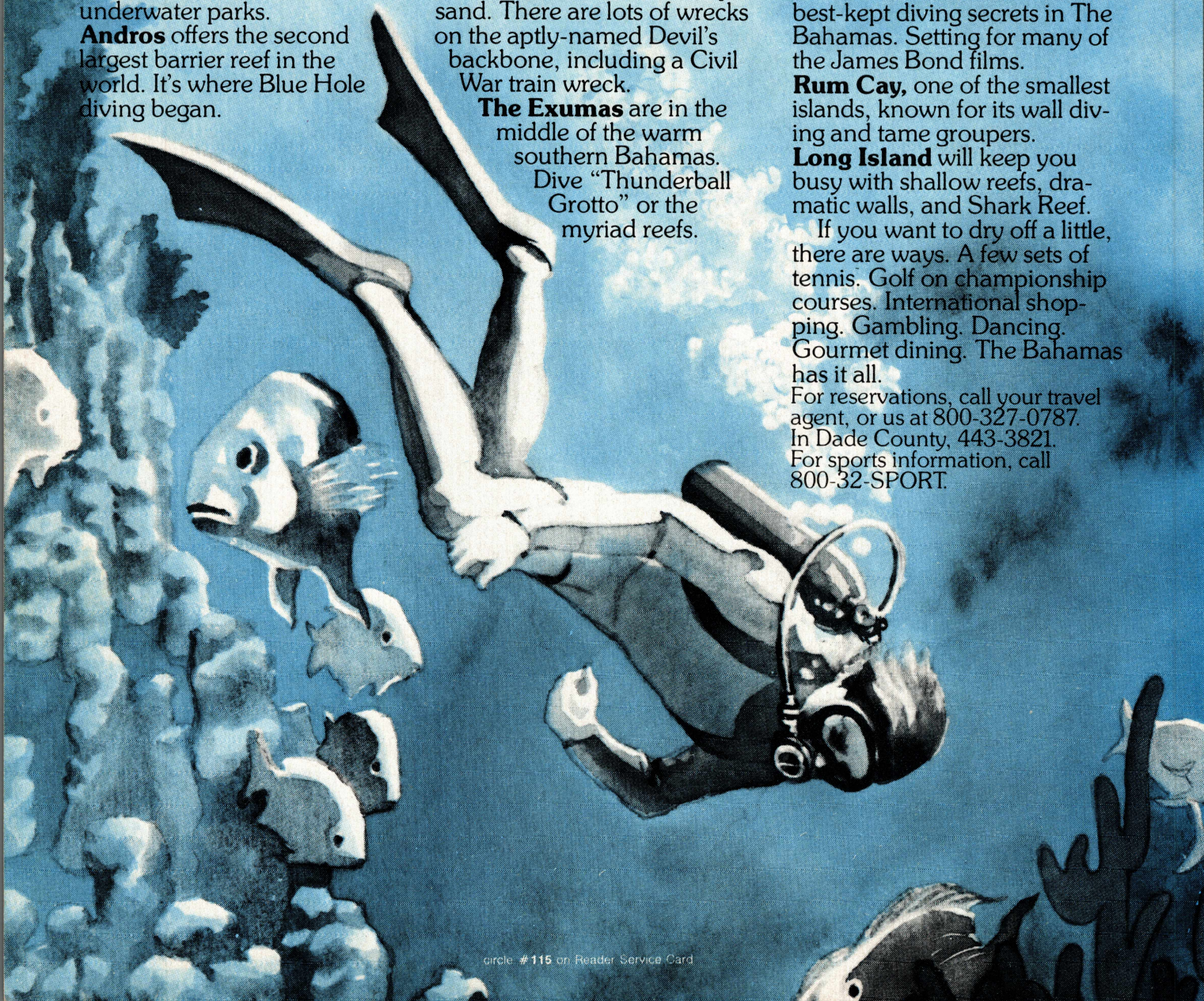
New Providence is one of the best-kept diving secrets in The Bahamas. Setting for many of the James Bond films.

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'84 CHRISTMAS SHOPPER'S GUIDE

The products listed in Shopper's Guide are those which the editors feel are of interest to readers. All specifications and claims are supplied by the manufacturers or sellers, who bear responsibility for their accuracy. It is impossible for SKIN DIVER to obtain samples of all products listed for evaluation and verification of manufacturer's claims. This listing is provided as a free service and vendors of U/W equipment are invited to submit information and black and white photos for consideration.



1 Inflatable—The MX1 inflatable boat from Novurania is 15' 7" long. It features a fiberglass hull and its inflatable chambers are made of neoprene/Hypalon layered polyester fabric. All seams are hand glued inside and out. \$5,495. Novurania of America, Incorporated, 2909 Oregon Court, C1, Torrance, CA 90503.



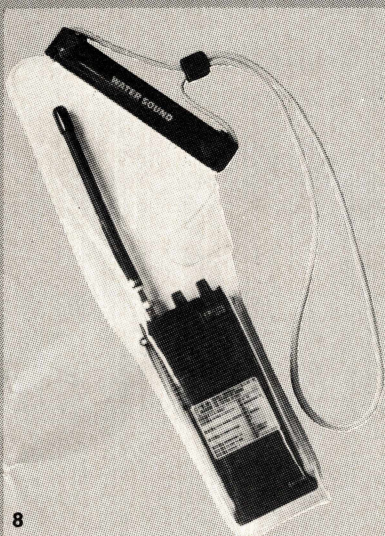
2 Adjustable BC—The Sea Jacket IV-A has adjustable backpack positioning and side panels. Interchangeable waistbands are available from small to extra large sizes. Curved shoulders eliminate chest squeeze. Rapid Exhaust Valve, chest fastener, carrying handle. Medium \$387, large \$392. From SeaQuest.



3 Stretch Wetsuits—The Plush Suit from Parkway is a four-way stretch nylon/neoprene laminate called Thermo-flex which fits close to the skin without binding. The suit's plush pile lining makes it slide on easily, even when wet. The Plush Suit is available in farmer john or high waist styles. From \$250.

4 Identification Capsule—SOS Talisman comes as a bracelet, pendant or watch-style, and holds personal data. It aids emergency personnel to assist the victim of an accident. Waterproof. From \$13.95, depending on style and metal. Toelbur Marketing, Inc., 10149 Hammerly, Suite 183, Houston, TX 77080.

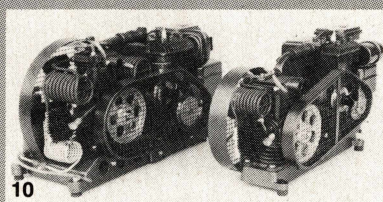
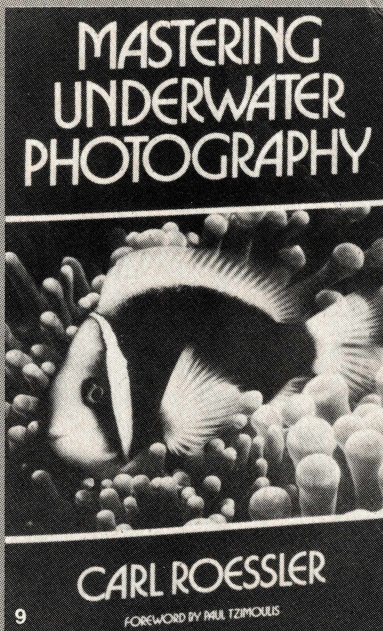
5 Nudibranch Calendar—Fifteen 9 x 12 inch color photos of nudibranchs from around the world illustrate this calendar. High quality lithography makes them suitable for framing. Identification and site information are included. \$7.50 per copy. Nudibranch Calendar, 475 W. Bradley Ave., El Cajon, CA 92020.



6 Buckles—Quick-Ditch buckles allow the diver to instantly tell the difference between the backpack and weightbelt buckles without looking. The weightbelt buckle (top) is notched and faces a different direction than the backpack buckle. Each is made of high impact Noryl® plastic. \$4 each at your Dacor dealer.

7 Dive Manual/Workbook Kit—Packaged in a resealable plastic bag, the Jeppesen Sanderson Open Water Deluxe Kit includes the *Open Water Sport Diver Manual* (4th edition, with additions and revisions), *Open Water Sport Diver Workbook* and Jeppesen Sanderson Sport Diver Open Water Tables. \$13.13.

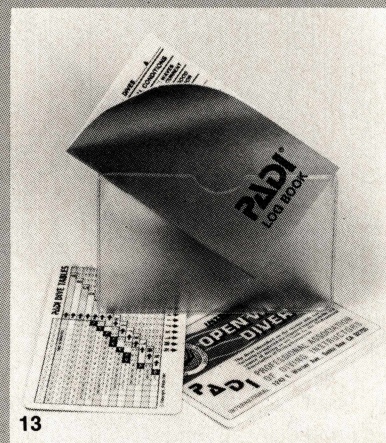
8 Flexible VHF Housing—EWA's Watersound-VHF is a double laminated, heat welded PVC bag with a built-in finger for operating controls. The housing protects VHF handheld radios, up to 2½ x 7½ inches (plus antenna), from water and dust. \$49. Pioneer & Company, 216 Haddon Ave., Westmont, NJ 08108.



9 Photography Guide—*Mastering Underwater Photography*, by Carl Roessler, guides the user to successful U/W photography techniques. Includes 40 exciting color photos as examples. \$12.95 plus \$2.50 postage and handling (Calif. add 6.5%). Sea Images, 680 Beach St., #340, San Francisco, CA 94109.

10 Lightweight Compressors—The FreshAir portable air charging system (PAC) is rated for 3,300 psi continuous duty and 4,700 psi bottle charging. The gasoline engine, 2.3 cfm model (PAC 3-SL, \$1,995) weighs 52 pounds and the 4.0 cfm model (PAC 5-SL, \$2,495) weighs 68 pounds. American Bristol.

11 Tanning Products—Malibu tanning capsules and tablets (80, \$29.95) contain canthaxanthin and produce a tan. Color Me Tan Creme (4 oz. \$29.95) stops skin flaking and Lotion (4 oz. \$34.95) will tan the skin overnight. Betty Kerr Enterprises, 2554 Lincoln Blvd. Suite 1111, Marina del Rey, CA 90291.



12 Dive Mask—The Mares Montego mask from SeaQuest has been redesigned with a more comfortable skirt and frame. It is low volume and the nose pocket is easily accessible. The ratchet strap lock mechanism requires no screws or springs. Five mm thick glass lenses. With blue or yellow frame, \$23.

13 Mini Logbook—Keep your dive log handy with PADI's Credit Card Log Book. No bigger than a certification card the logbook can be carried in a wallet. It comes with its own vinyl carrying case which can also hold a certification card and PADI Credit Card Dive Tables. Logbook can record up to 32 dives. \$2.30.

14 Dive Masks—Scubapro's Viva face-mask is lightweight and the single lens offers a wide view. The low volume mask has a high impact plastic frame and retainer to secure the lens. Available in silicone rubber with a clear frame and black retainer (\$50) or neoprene rubber with orange frame and white retainer (\$25).

The Titanium
Diver's Watch
Die Titan Taucheruhr
La Montre de Plongée
en Titane
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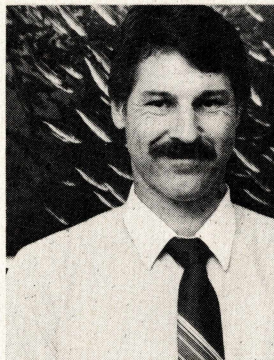
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American PD Company, Inc., 2049 Century Park East, Suite 2480, Los Angeles, CA 90067, Tel. 213/553-1300.

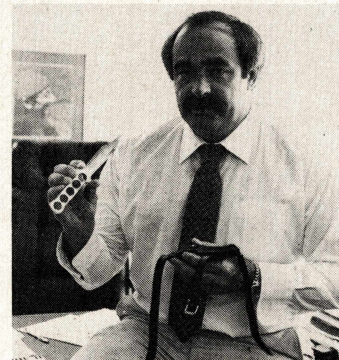
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AQUACRAFT

TEXT AND PHOTOGRAPHY BY ERIC HANAUER



Carl Long



Bill Costello with Omega knife.

How many Aquacraft products did you use on your last dive? Probably a lot more than you realize. Did you replace an O-ring? Did you repair a tear in your wetsuit or use a lube solution to put it on? Did you fasten a goodie bag to a brass clip on your weightbelt? Did you stand your tank on its boot or hang your wetsuit on a special hanger? Chances are that all those things and many more that you use regularly, came from Aquacraft. For more than 25 years, the San Diego based company has quietly and efficiently been supplying the needs of divers all over the world. The company carries many items overlooked by other firms because they

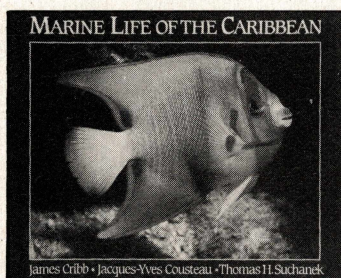
seem small and insignificant—but without them we might not be able to go under.

Aquacraft was recently saved from going under in another sense, when financial problems nearly caused the company to close its doors. Rescued from dissolution by an eleventh hour reorganization, it is currently on the comeback trail with a new name, Aquacraft II. How this was done and where the company goes from here is the subject of this story.

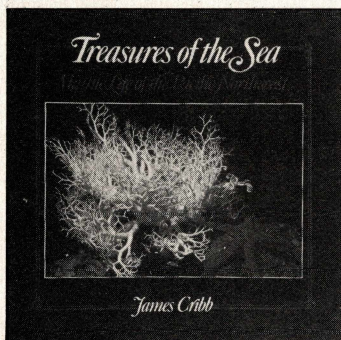
Founded in the late 1950s by Bill Martin, Aquacraft developed a strong following for its extensive line of diving accessories. Whatever a diver needed, from buckles to booties, spearguns to slurp

guns, strobes to Samantha posters, Aquacraft had it. In many cases, the customer didn't even know that the purchase was an Aquacraft product. But the dive store owner did. With more than 800 items available, the company developed a reputation for fast, efficient deliveries and service. Thanks to Martin's leadership and sound business practices, Aquacraft was doing \$2.8 million worth of business annually.

But Martin's health was failing, so he reluctantly decided to sell the company. It was bought by an entrepreneur from outside the diving industry. Ignoring the conservative fiscal policies that had



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MARINE LIFE OF THE CARIBBEAN: Introduction by **JACQUES-YVES COUSTEAU** who describes the oceanographic origins and ecology of the Caribbean and recounts personal experiences aboard Calypso. **THOMAS SUCHANEK**, Ph.D., marine biologist, University of California, provides extensive biological captions.

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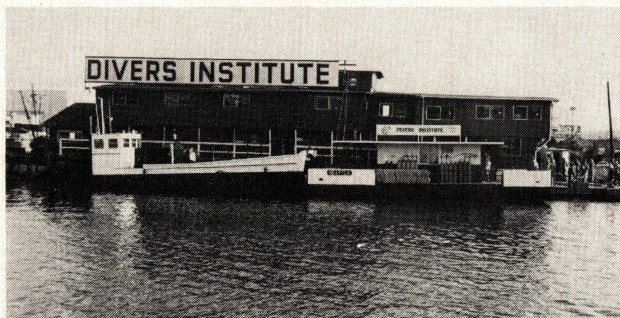
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Photo by: Mike Massey

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AQUACRAFT II

made Aquacraft successful, he made some unfortunate moves. It wasn't long before Aquacraft was deeply in the red, had defaulted and was taken over by a bank. One person had faith in the firm and felt it could be salvaged: Carl Long. An engineer and a minority stockholder, Long had been with the company 13 years. He is an expert in manufacturing and was running the machine shop he had originally set up. The bank asked Long to take on the responsibility of managing the company and finding a buyer with the resources and the background to make things work. Bill Costello was that man. A former fisheries biologist, Costello owned San Diego's PADI College and two successful dive stores. The deal was consummated on a Friday; the plant had been scheduled to close on the following Monday. Although not one day of shipping was missed, it was a close call.

When it reopened its doors, Aquacraft II was a new company with new leadership. Carl Long was now the president and Costello the vice president. Their immediate goal was to return to the basics that had made Aquacraft successful in the first place: Conservative fiscal management combined with reliability and customer service. Several factors were in their favor. The company had an excellent reputation. Some 60 percent of the 800 items in the product line are manufactured in-house, so there is an ability to control inventory. Extensive warehouse facilities allow the company to ship 75 percent of all orders within 24 hours.

"But no one can succeed today by just being an accessory company," said Costello. "We've got to move into the more technical items." He showed me through the research and development division, where engineers are working on some highly advanced products. Although in the early stages of development and a couple of years away from distribution, they demonstrate the owner's faith in the future of Aquacraft II.

Diversification is another aspect of future plans. Under the former owner, the company had entered the boardsailing market. With 350 dealers around the country, Costello feels this area has a lot of potential and will be retained. Ann Gardner Nelson, Olympic silver medalist in all-around boardsailing, has signed with Aquacraft II and will represent it in international competitions. Eventually a signature line will be produced featuring her name. "But we still are and will continue to be a diving company," Costello explains. The boardsailing line will be a subsidiary, under a different name.

Over the years, spearguns and hunting equipment have been a mainstay of Aquacraft products. Demand in that area continues to be strong, accounting for

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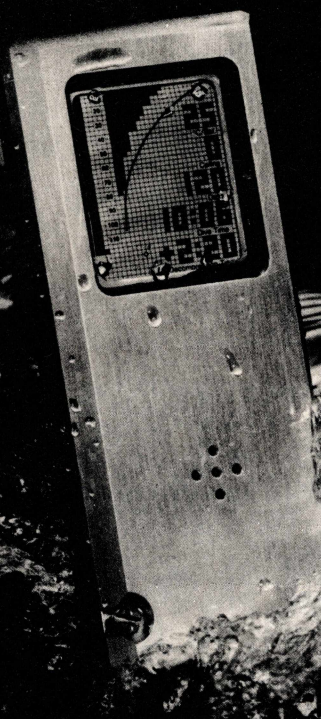


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AQUACRAFT II

about one-third of the gross sales. For spearfishing, all rubber powered guns and polespears are manufactured in-house, including the highly respected Bandito line. The Ranger series of pneumatic guns is made in Italy. Interest in hunting varies according to geographical regions and is strongest on the East Coast. But even in California, divers flock to the stores when lobster season rolls around. Aquacraft II is ready to supply their needs with goodie bags, gauges and gloves. Speartips, reels, stringers, clips, ab irons and knives round out this portion of the line.

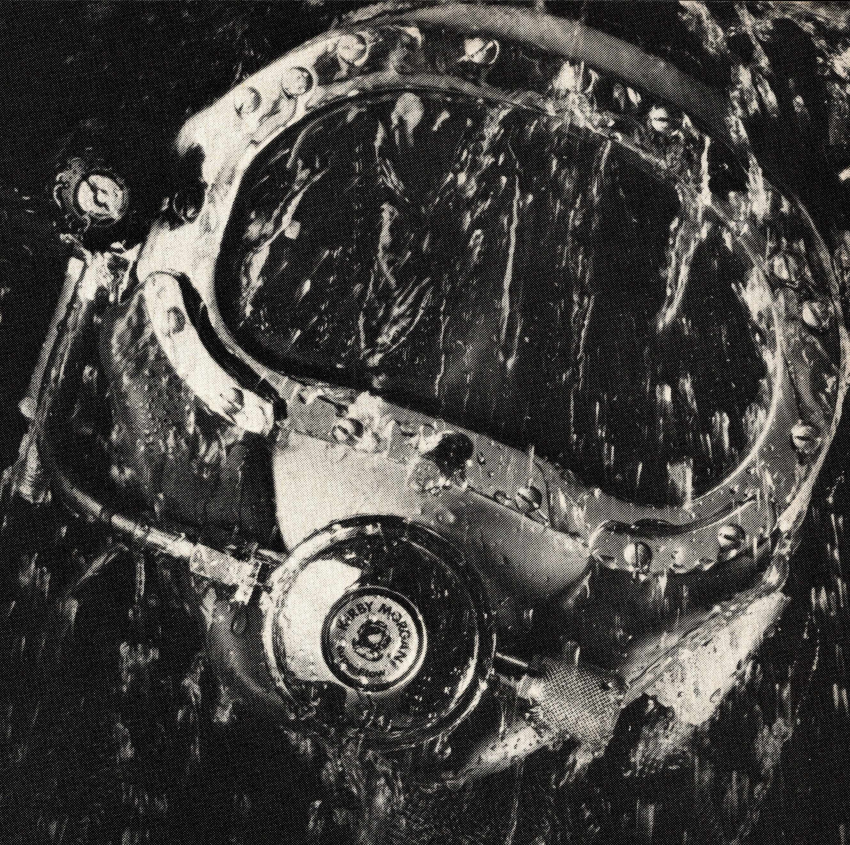
Photographic products include lenses, extension tubes, framers and camera lines. A new disc camera housing, which was withdrawn from the market, will be reintroduced at the 1985 DEMA Show. It had had leakage problems owing to the sharp angles of the O-ring groove. Now that the bugs have been worked out, it should prove a valuable tool for underwater snapshooters. It features a slide lens that will allow close-up photography.

As divers continue to accumulate more high tech accessories, the need has arisen for better means to store and protect them. Aquacraft II's answer is the Add-a-Bag System. It begins with a basic dive bag of rugged Cordura nylon, to which additional containers can be added by means of non-corrodible fasteners and Velcro® strips. These include a padded regulator bag and a generously sized utility bag that can be attached to the main bag or carried separately.

In addition to its own products, Aquacraft II continues to do OEM (Original Equipment Manufacture) work for other companies. It will also continue to do custom work for dealers, such as dive flags with the dealer's logo.

Costello thinks it's ironic that so many divers depend upon Aquacraft products, but don't know where they came from. To counteract this he has embarked upon a more aggressive plan of marketing and product identification. The Aquacraft II logo will appear on nearly all the company's products, from fin straps to dive bags. Through a new telemarketing concept, each account will be contacted monthly. This group will also double as field reps. This will enhance customer service and should solve small problems before they become big ones.

With its line of more than 800 products, Aquacraft II fills a need in the diving market that probably couldn't be met by any other single company. With a new management team and sound fiscal policies, it should be around to supply the needs of divers for many years to come. For more information contact: Aquacraft II, 7992 Miramar Road, San Diego, CA 92126; (619) 271-7000.



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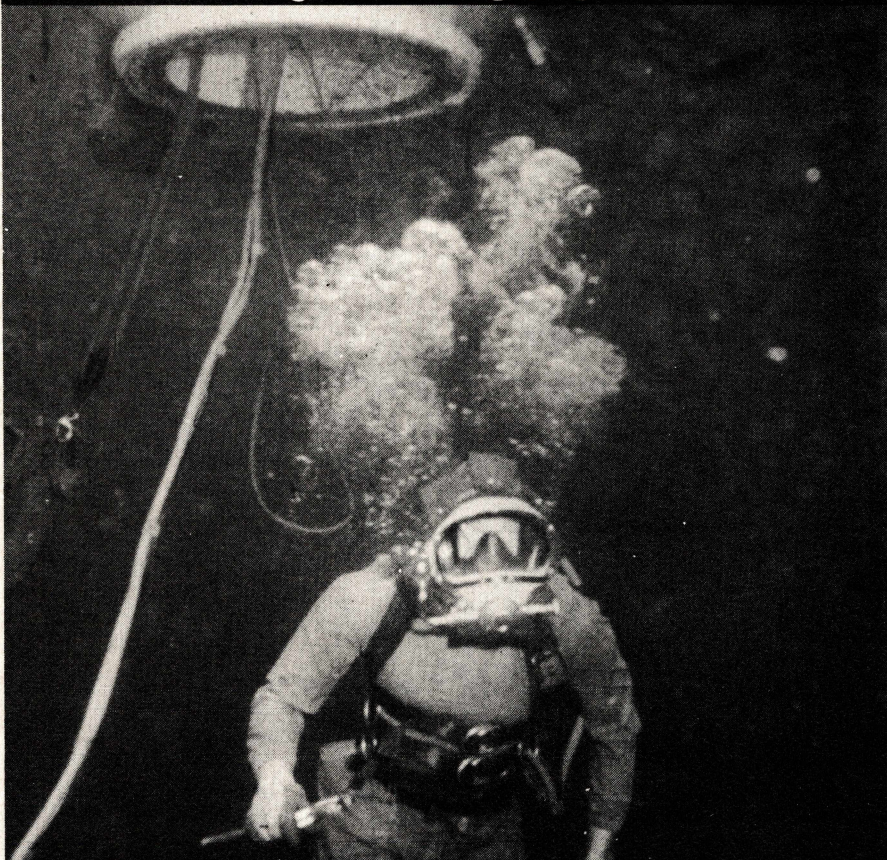
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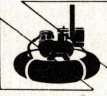
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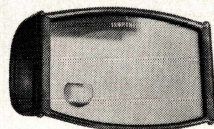


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Season's Greetings

BY LINDA L. ROSENDORF

Looking for something different in the way of a holiday greeting card this year? Why not send a card that reflects your diving interests and shows the underwater world as you see and enjoy it? It isn't necessary to be an expert underwater photographer to create special cards and gifts that will excite your friends and family. I have found both divers and non-divers are thrilled with the unusual cards I send out each year and the stationery I have designed.

I have been sending out greeting cards with underwater scenes for the past six years. Each year I select one of my favorite shots from a trip I've taken in the past



12 months. Not only do I get to tell everyone about my exciting dive vacation, but I can also illustrate what I saw underwater. I usually choose a slide which has colorful fish and coral, but last year I sent out a shot of a large shark (which grew larger in every accompanying letter I wrote) I had photographed in the Sea of Cortez. My friends look forward to each year's arrival. No matter how many holiday greeting cards people receive, I know mine are unique.

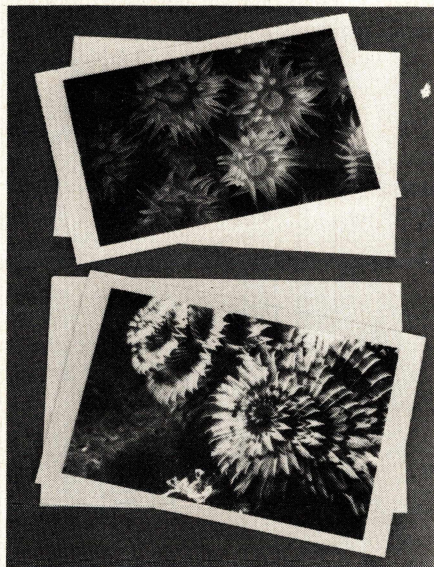
Yours, too, can be unique and reflect your own diving interests. Beautiful and highly colorful macro subjects, including Christmas tree worms and nudibranchs, make ideal subjects. If you are an avid wreck diver, send a card with your favorite wreck and describe the history of the ship and what it's like diving on it. Your friends will be fascinated.

Start looking through your slides or negatives early in the fall. Most photo greeting card companies even have an incentive of 20 percent discounts if you order early. Choose a photo which is colorful and has a central theme—a fish, diver, nudibranch, wreck, etc. You cannot crop the photo, so select a shot in which the entire scene is sharp and emphasizes your subject. Kodak has a special overlay technique that allows you to write a short message anywhere on the print. The letters appear white, so it's neces-

sary to choose a photo with a dark background. My shark photo, for example, had been shot with natural light so I had plenty of blue background to overlay my message, "1984 — Go for it; Have a great year!"

While you are reviewing your slides or negatives, also look for photos which might make holiday presents. It's trite, but true, that personalized gifts have a lot more meaning. Enlargements of your best prints are always welcome. They also make great wedding gifts.

Last year I decided to design stationery with my underwater photos. These can



be done less expensively than printing enlargements and make great gifts. Naturally, you can also use this stationery for your own letter writing. Wallet size prints are okay, but I find $3\frac{1}{2} \times 5$ inch prints give you more for the money and are the right size for fold-over notes. Shop around for the best deal on multiple prints from the same slide or negative. I used Kodak's special Christmas rate which is available at the same time as photo greeting cards. I printed up 25 each of five different photos and divided them into packets of 10 notes (10 gifts and lots of stationery for myself as well). I bought boxes of solid color paper with envelopes to match, a different color for each photo. Some stationery stores carry paper and envelopes in a wide variety of colors and sizes which can be bought by the pound. Letter size stationery needs to be folded in half for notes. The folded paper size should be about 4×6 inches so that there is a border around the photo. The print is then mounted to the front of the note card. I have never been adept with glue and I found 3M's Scotch brand double stick tape ideal for mounting. Preparing the 125 cards took less time than baking batches of Christmas cookies.

There are numerous possibilities for clever cards and gifts if you use your imagination. Let this be the year you show off your underwater photographic talents! 

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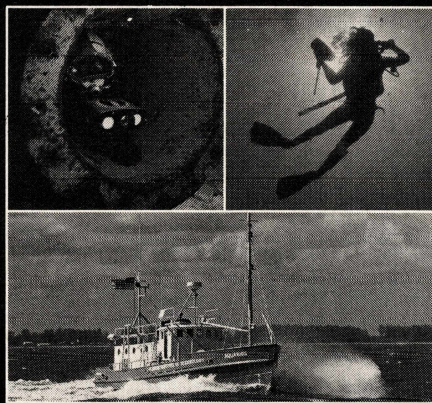
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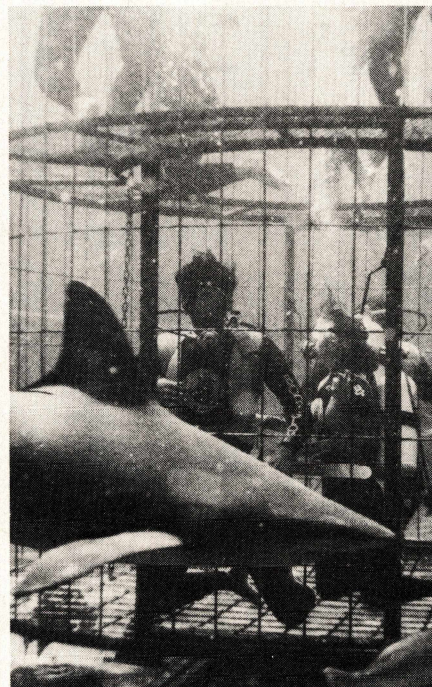
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of eight, divers descend in a cage to 20 feet for a total of 20 minutes. The divers are viewed by family and friends through two levels of observation windows.

The shark cage has a diameter of 10 feet and measures 23 feet high with stainless steel bars. The water is 71°F.

Pre-registration and current scuba certification are required to participate in the year-round program.

The official equipment sponsor of the Shark Cage Adventure, Dive N' Surf of Redondo Beach, supplies each diver with a full length Body Glove wetsuit and scuba gear. Marineland provides participants with bathing suits, dressing rooms, showers, hair dryers and towels.

Each dive is \$25 plus admission to the park. Divers are encouraged to bring their own underwater cameras or rent a camera from the park. ➤

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INTERVIEW

Louis Prezelin On Assignment with Cousteau

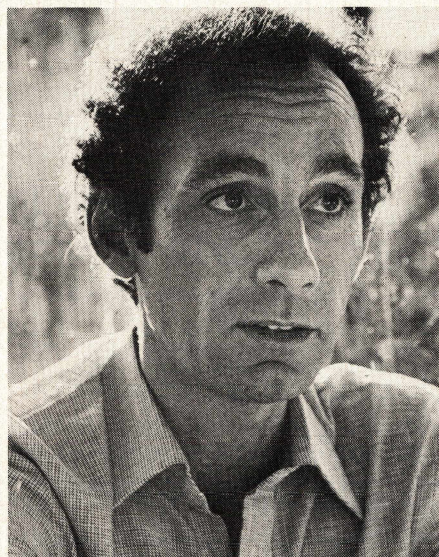
BY HILLARY HAUSER

Louis Prezelin once dived into a feeding frenzy of piranhas and, while the fierce little fishes nibbled on his cheeks and hands, he filmed another diver hand-feeding them. When one of the sharp-toothed fishes took a bite out of his hand, Prezelin got out of the water.

A piranha frenzy is an odd situation for most people to be in, but it is just another day of work for Prezelin, who is a cameraman for Captain Jacques Cousteau.

The word "work" may not seem like an appropriate title for having adventures around the world with a famed French explorer, but Prezelin always speaks of his experiences from the standpoint of a professional photographer. He is, in fact, very low-key about the adventures he has had, and most of them are adventures few others could possibly have.

Like Cousteau, Prezelin, 37, is French. He was born in Cholet, a little town on the Loire River in Western France and started diving at age 10, before he learned to

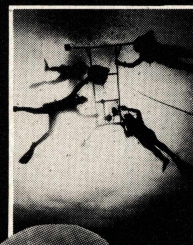


photo/Lesley Newhart

swim. At age 22, after serving as a rescue diver in a French helicopter squadron, he answered a call for divers—from a group headed by Cousteau.

Prezelin's first assignment came in the following year, in 1969, when he came to Catalina Island as a jack-of-all-trades diver. Here, the Cousteau team used a diving saucer to film great clouds of squid in the night ocean and swam with blue sharks that swarmed about in a feeding frenzy. This adventure, which resulted in

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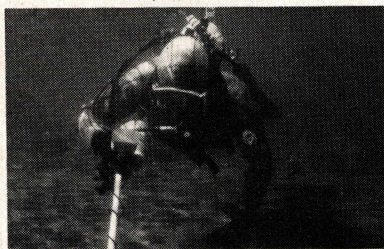
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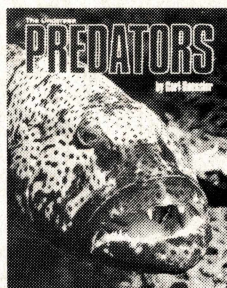
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LOUIS PREZELIN

the television film, *The Night of the Squid*, Prezelin recalls as one of the most exciting experiences of his career.

"That's probably because it was new to me," said Prezelin. "One of my first jobs on the *Calypso* was to pick the rust off the anchor. I could barely speak any English at all."

Since then, Prezelin has done 20-25 shows with Cousteau—either in front of the camera as a diver or explorer or behind the camera as a cinematographer. He comes and goes on an irregular basis from his home in Santa Barbara, California. He lives there with his wife, UCSB biologist Barbara Prezelin, and their three year old daughter Christine (who speaks both French and English). When he's home for any length of time, he teaches underwater photography at Brooks Institute—something he's done since 1976.

One of Prezelin's most recent assignments for Cousteau—which took him into the middle of the piranha feeding frenzy—was as a cinematographer for the two year survey of the Amazon basin in South America. From April 1982 to August 1983 he explored the Amazon River with other teammates. They traveled from its source—17,000-18,000 feet up in the Andes—to various tributaries. They explored deep jungle areas by river rafts and four wheel drive vehicles—at one time driving themselves into an area so narrow and difficult that they had to back up for five miles to get out.

For the piranha segment of the Amazon project, Prezelin and his teammates first surveyed piranha-infested waters in bathing suits. The only time piranhas become dangerous, he said, is during the dry season, when the waters dry up and form isolated ponds. When this happens, the fishes begin to go hungry and a person stepping into a pond of hungry piranhas will find himself in trouble.

Prezelin said the Cousteau team had to chum the waters for a time to get the piranhas interested.

"It took a while," he said. "We used meat, chicken, to get them excited—did that for several days. Then, one pound of meat disappeared in seconds."

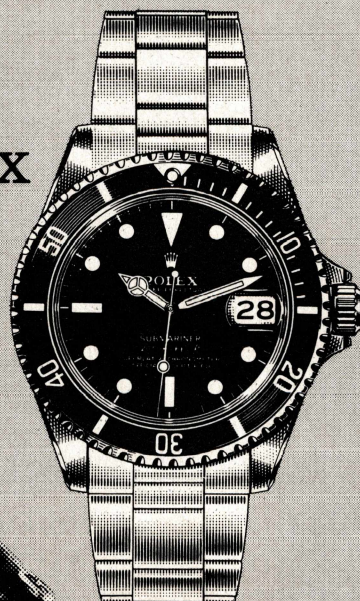
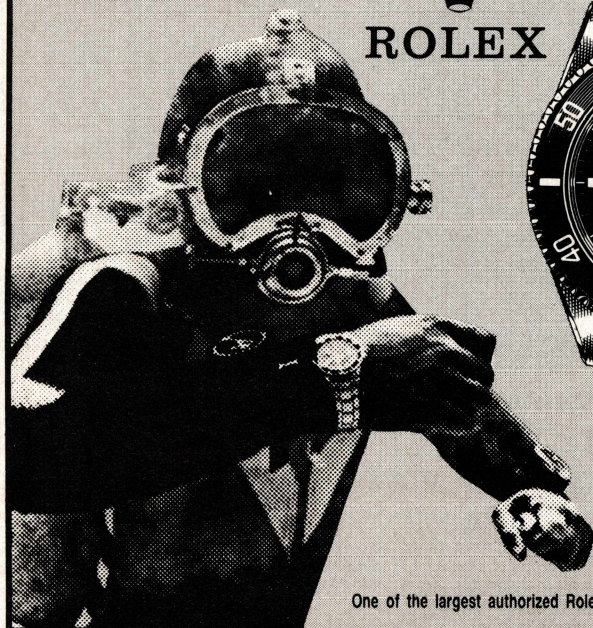
When the fishes got excited, Prezelin began to film. Divers wearing black gloves were fine with the fishes, he said, but in operating the camera, his hands were bare. The fishes interpreted bare hands as meat and when Prezelin was bitten, it was a signal to him—and the others—to get out. The resulting film shot by Prezelin and his teammates was aired this past spring.

The next month he and five other men, including Captain Cousteau, left Tangiers aboard a 65 foot catamaran called *Moulin a Vent* (windmill), bound for New York.

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But instead of sails, the boat had a special "aspirated" wind cylinder 44 feet high that, from a distance, looked like a giant smoke stack aboard a tiny boat.

The wind cylinder had been designed by a French student of aviation, Bertrand Charrier, on a 19th century theory known as the Magnus effect. Named for the German chemist Heinrich Gustav Magnus, the effect is essentially a lift that arises from the lateral force of an air current on a cylinder. The cylinder aboard the *Moulin a Vent* had moveable shutters exposed to the wind and a 12 horsepower fan which sucked wind through a vent into the cylinder to increase lift and propulsion for the boat.

Examining wind tunnel tests for the system, Cousteau had seen that with less than 150 horsepower to suck air into two cylinders, an 800 ton ship could be propelled in a 24 knot crosswind at 15 knots. He began to think of the *Moulin a Vent* expedition as a way of testing the idea, because he wanted to incorporate a self-contained energy system into the design of the new ship that will eventually replace the *Calypso*.

Prezelin said that the *Calypso II* will replace the original *Calypso* in three to four years and that it will be a "very sleek ship with a helicopter platform, space for a diving platform and all of those things, but it will be pollution-free."

During the trans-Atlantic voyage of the *Moulin a Vent*, said Prezelin, the wind system worked well, but the boat was too heavy. "It dragged and rammed the waves instead of riding them," he said.

In a Caribbean storm, this problem eventually caught up with the sailors. Two days outside Bermuda, the *Moulin a Vent* ran into the last of three big storms it had encountered during the voyage. With 25 foot waves pounding the boat, the giant cylinder broke off with a resounding crash, and the *Calypso*, which had met the boat outside Bermuda, had to escort the voyagers to port.

Prezelin's main recollection of the incident—in his characteristic low-key, French style—is that it was 2:30 am when the falling cylinder hit the deck and that he had a problem of getting into his pants fast enough to get out on deck to see what had happened.

Prezelin said that the present Cousteau project is a photographic survey of the Mississippi River—from its source (Minnesota) to its mouth (Louisiana).

"It will be something like what we did in the Amazon," said Prezelin, explaining that cameras would focus topside and underwater as the explorers make their way along the 2,348 mile waterway. Before he left to join the team, he didn't know exactly what he was to be doing as his part of the work.

That's all part of the adventure—not knowing—and in the final analysis, it's all in a day of work when you're on assignment with Cousteau. 

From **skin diver** magazine's Fish of the Month column



**The Perfect Gift
Even for Yourself!**

Book of Fishes
by Hillary Hauser
with Foreword by G. Carleton Ray
and photos by the world's leading
underwater photographers
Large format—8½ x 11 inches
full color throughout, 192 pages

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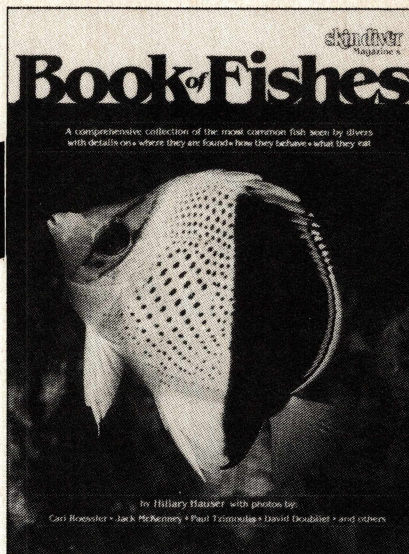
- informative guide on the life habits of the fish most commonly seen by divers and snorkelers
- beautiful coffee table book of photographs by the world's leading underwater photographers
- an instructive text on underwater photo techniques

For more than ten years the most popular column in *Skin Diver* magazine has been its beautifully illustrated and highly informative Fish of the Month Series. Now the best photographs from that exciting series have been brought together under one cover in *Skin Diver* magazine's *Book of Fishes*. With the exquisite photos is a newly revised and updated text by the author of the original column, Hillary Hauser.

The text, based on the most recent scientific research, tells how the different fishes behave, where they are found, what they eat, and more intimate details about their life cycles. Organized so that all the fish of a particular family are grouped together, the book becomes an excellent identification guide illustrated with photographs that are among the best ever taken of marine life in their natural habitat.

Partial listing of the fish families represented:

Tarpons • Lizardfishes • Moray Eels • Trumpetfishes • Seahorses • Batfishes • Squirrelfishes and Soldierfishes • Barracudas • Scorpionfishes and Rockfishes • Groupers and Sea Basses • Soapfishes • Basslets • Bigeyes • Cardinalfishes • Jacks and Pompanos • Snappers • Grunts • Croakers and Drums • Goatfishes • Spadefishes • Left-eye Flounders • Jawfishes • Flying Gurnards • Angelfishes • Butterflyfishes • Damselfishes • Hawkfishes • Wrasses • Parrotfishes • Blennies • Pricklebacks • Gobies • Surgeonfishes • Moorish Idols • Triggerfishes • Filefishes • Trunkfishes • Puffers • Porcupinefishes • Molas



The photographs

The world's leading underwater photographers have been contributing to the Fish of the Month column. Carl Roessler, Paul Tzimoulis, Jack McKenney, David Doubilet, and Chris Newbert are some of the important photographers whose pictures are included.

Technical details on how the pictures were made accompany the photographs. The film, equipment and exposure used are all given. For amateur underwater photographers this information alone is worth the price of the book because it is in effect the logged notes of the leading professionals.

The drawings and maps

Detailed drawings accompany each of the photographs. These show juvenile stages and alternate forms which are sometimes strikingly different. These drawings, plus maps to show the areas in which the various fish are found, make the *Book of Fishes* one of the most useful and informative books for divers recently published.

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Technifacts

BY E.R. CROSS



Diving under arctic conditions can be a challenging and sometimes exciting experience. But, extremely cold water diving can be potentially hazardous unless there has been proper planning for both the diver and topside support personnel. My personal experience has been limited to working under ice while using helmet gear or a full facemask with surface supplied air. This month's Technifacts will deal with arctic diving for the sport diver.

I would like to thank Russel Kunibe and Tim Carr of Marine Service and Diving Company in Homer, Alaska, for sharing their cold water diving experience with SKIN DIVER readers. They frequently serve as dive guides for Alaska mid-winter dive charters.

There are both rewards and potential

hazards in diving in very cold water. The rewards are a chance to study a unique marine environment under its real icy conditions and almost always, with the best visibility. In river and lake diving there is also less water and less current to contend with in winter. Gold mining divers in Alaska use this fact when they do their placer mining under the ice in mid-winter.

Winter temperatures of the open arctic ocean range from about 28 to 32°F. With this comes topside weather where freezing temperatures and wind make the water seem warm and as Kunibe said, "Everyone wants to be the diver." Both diver and topside support personnel face a unique challenge: To bring equipment and diving skills into harmony to produce an interesting and successful diving trip.

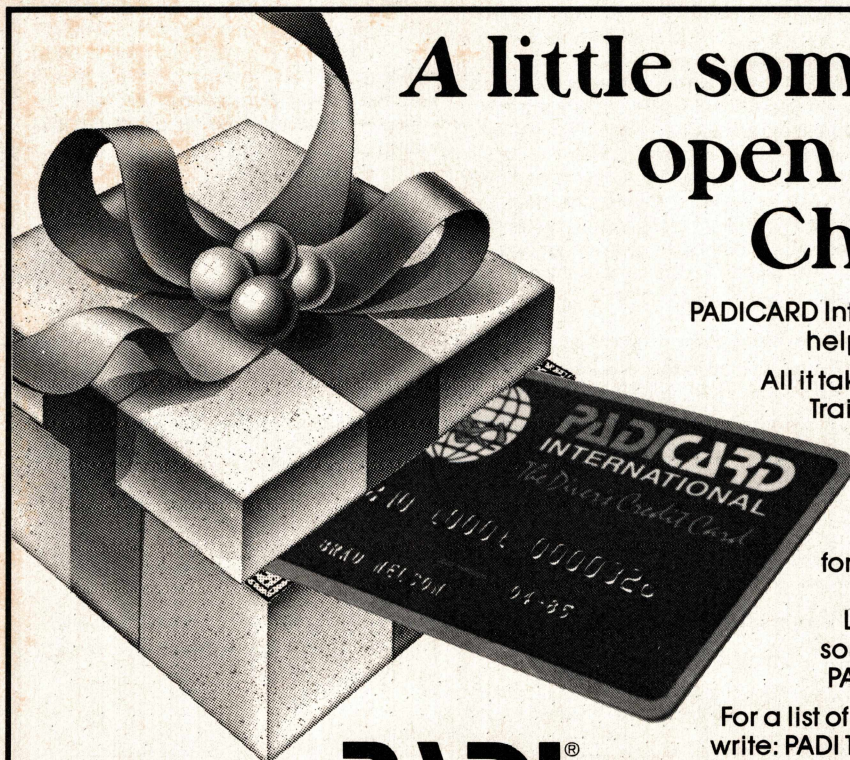
The *U.S. Navy Diving Manual* states, "Polar diving conditions affect an underwater operation but do not prohibit them when proper precautions are taken."

SURFACE SUPPORT

In arctic diving, surface support takes on a great deal of importance. Such diving cannot be conducted without several forms of surface support.

My own experience in arctic diving has been rather limited. The coldest conditions occurred diving an underwater cutting job in a Canadian river: There was four feet of water under three feet of ice. Topside temperature was in the high 20s. The job was to cut off 20 feet of interlocking sheet pilings before the spring break-up of river ice. Owing to flight logistics I
(Continued on Page 100)

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Ocean Watch From Porsche Design

Ultra Tough—Ultra Sophisticated



The Ocean watch from Porsche Design comes with a zipper closing, leather case which holds the watch, a screwdriver and nylon strap.

BY JIM WALKER

Titanium has long been used in surgical instruments, racing car components and in the space industry. It is extremely corrosion resistant, antimagnetic and as tough as high grade steel—with half the weight. Titanium isn't used except in very demanding applications because it is hard to work with in manufacture and it is eight to ten times as expensive as steel.

Despite the costs involved, when Ferdinand A. Porsche (the man who designed the Porsche 911 automobile) conceived the Ocean dive watch he chose titanium as the material for the case and bracelet. After all, diving is a very demanding sport. Not only does titanium make the watch light, it makes it ultra-tough. The Ocean watch can withstand an incredible depth of 6,500 feet! Titanium also allows a unique, slim design reminiscent of a Porsche automobile and doesn't require any plating as a finish.

Developed in cooperation with the German Navy, the Ocean watch was engineered from the wrist up, breaking away from traditional concepts. The crystal is 1/6 inch thick and made of ultra-hard sapphire glass. The glass actually rates a nine out of a possible ten on a hardness scale. This makes it extremely scratch resistant. The crystal is specially

curved to withstand great pressure. The screw-down crown is waterproofed with one axial seal and two O-ring seals.

The watch's Swiss made, precision movement has an automatic winding mechanism positioned on a nine ruby micro-ballbearing which, in turn, is placed in a special shock absorbing membrane. An additional 22 rubies reduce friction in the mechanism. The balance wheel pulses 28,800 times an hour for reliable, accurate timekeeping.

The watch face is black, with a sweep second hand, white markings and luminous hands and hour positions for easy reading in dim light. There is also a date window near the three o'clock position.

For safety the watch bezel only turns counterclockwise. If an error is possible it would be made on the side of safety, i.e., showing more dive time than was actually accumulated. Additionally, the bezel can only be turned if first pressed straight down, equally, on opposite sides. This can be done while wearing gloves. When turning the bezel U/W, its precise click stops (each corresponding to one minute) are audible. The bezel can be removed easily (two screws) for cleaning.

The titanium watch bracelet has a unique link mechanism which can be adjusted in 5 mm increments to fit any wrist.

It incorporates a special snap-over clasp with a push button safety catch. Thus, the bracelet can't pop open accidentally.

The Ocean watch also comes with a tearproof, Velcro® closing, gray nylon wrist strap that, when worn over a wetsuit sleeve while diving, can be quickly adjusted to accommodate the suit's compression at depth.

The Ocean watch comes in a zipper closing, leather case with a screwdriver. Its three tiny blades fit the screws on the bracelet links and on the bezel. The top of the screwdriver is a compartment for storing extra link screws and additional screwdriver blades.

The Ocean is perfect for dress wear. Its semi-gloss, silver-gray finish and flowing shape create an elegant look while setting it apart from any other timepiece. Of course the Ocean watch isn't for everyone, just as the Porsche auto isn't for everyone. At a retail price of \$2,200 it definitely makes a statement about the owner's commitment to quality. It comes with an international warranty and warranty card.

For more information, a brochure or the address of the nearest dealer, contact American Porsche Design, 2049 Century Park East, Suite 2480, Los Angeles, California 90067. 



OCEANIC'S SERIES 3000

**The World's First
Digital U/W Strobe**

TEXT AND PHOTOGRAPHY BY GERI MURPHY

Oceanic, of San Leandro, California, recently introduced the world's first underwater strobe featuring computerized digital logic circuitry. Christened the 3000 Series this new line boasts the latest state-of-the-art electronic designs. It offers the underwater photographer a new level of quality control. Two models of the new series are currently available. The 3002 automatically adjusts flash duration for properly exposed photos. This unit comes with a special sensing head that measures the amount of light reflected from the subject. The 3003 is a multi-function dual power strobe that recycles in three to four seconds on full power. On half power it recycles in less than one second. This means it will couple with motor drive units that have a one second recycle time and that action se-

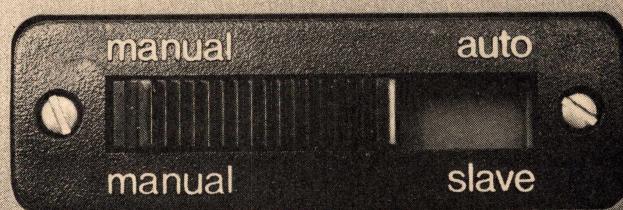
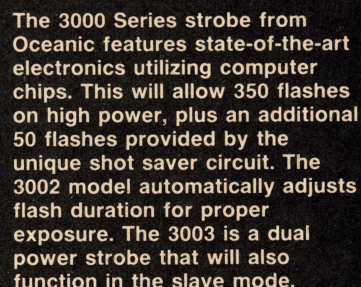
quences are now possible. This unit will also operate in the slave mode.

The brain of the new strobe is a series of three major integrated circuit (IC) computer chips which control practically all its functions. One of the major tasks of these chips is to manage the electric current utilized for firing the strobe. Unlike their predecessors, the 3000 Series strobes will not fire until the flash capacitor is 100 percent loaded and within 10 volts of its peak rating. Each and every flash is fully regulated and has the same power.

Another feature of the new computer control system is that the strobe automatically reforms the capacitor each time the unit is switched on. There is also an amber warning light which goes on when battery power drops below one-third of its total capacity.

One of the most outstanding features of the new 3000 Series strobe is its radically designed flash reflector. The standard parabolic reflector has been replaced with a more efficient step-type that focuses more light on the outer edge of the light cone. The new strobe has the same f stop output in the center of the cone, but the outer edge fall-off has been cut in half. There is only a 1.5 f stop fall-off as compared to the 3 f stop fall-off on the older 2000 Series. The white retaining ring on the front of the strobe is part of this new reflector system.

The new step-type reflector also provides a greater angle of coverage than its predecessors. The 3000 Series is rated at an ultra-wide 110 degree angle of coverage as compared to 95 degrees on the 2000 Series. In order to handle the wider



Above: Magnetic slide switches on the 3000 Series eliminate through-housing fittings. The step-type flash reflector and coiled flash tube (left) provide 110 degree angle of coverage with only a 1.5 f stop fall-off at the outer edges.

For more information about the 3000 Series strobes, contact Oceanic, 14275 Catalina Street, San Leandro, California 94577; (415) 352-5001. 

LAKE SUPERIOR'S WRECK OF THE MIZTEC

*Wooden Schooner Lies Protected
In Lake Superior Waters*



photo/courtesy the Milwaukee Public Library

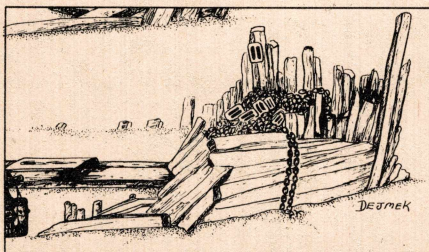
Divers, particularly die-hard wreck divers, always have a secret dream of discovering a new shipwreck. I and a group of "die-hard" wreck diving companions did just that in September 1983. We dove a newly found wreck off Whitefish Point in Lake Superior. It was the *Miztec*, a three masted wooden schooner barge that foundered on May 14, 1921 with a loss of five lives.

The *Miztec* was built in 1890 at Maine City, MI. She was 194.1 feet in length, with a beam of 34.6 feet and a draft of 14 feet. She had a gross tonnage of 777 and a net tonnage of 738. She was engaged in the lake trade until her sinking.

The *Miztec* has a special significance for the Lake Superior diver. She was a minor participant in one of the most well-known tragedies in the Whitefish Point area. In November of 1919 she was being towed by the wooden steamer *Myron* toward the Soo. Faced with a vicious northwesterly gale with 50 to 60 mph winds, the *Myron* began to leak badly. The *Miztec* was cut loose from her and the *Myron* attempted to make it to the safety of Whitefish Bay. Three miles from the point and one and one-half miles from shore she sank. Sixteen crewmen died because rescue ships were unable to reach them amid the waves and loose cargo. The captain of the *Myron*, who refused to take to the lifeboats, was the only survivor—he clung to the roof section of the pilothouse and was rescued some 20 hours later. The *Miztec* fared better than her steamer; she dropped her anchors and rode out the gale and was towed to the Soo by a freighter.

One of the remarkable twists of fate is that the *Miztec* herself sank a scant one and one-half years later and in a spot only about two miles from the resting place of the *Myron*. It was as if she decided at last to join the steamer on the sandy bottom of Lake Superior.

The *Miztec* was discovered with side-scan sonar by Tom Bathey of Venture North in Munising and Frederick Stonehouse of Marquette. Both men are well-known Lake Superior wreck divers; Stonehouse is the author of numerous books on shipwrecks in the lake. I was



illustration/Linda M. Dejmek

lucky enough to be among the first group to dive the wreck, less than a week after its discovery by Bathey and Stonehouse.

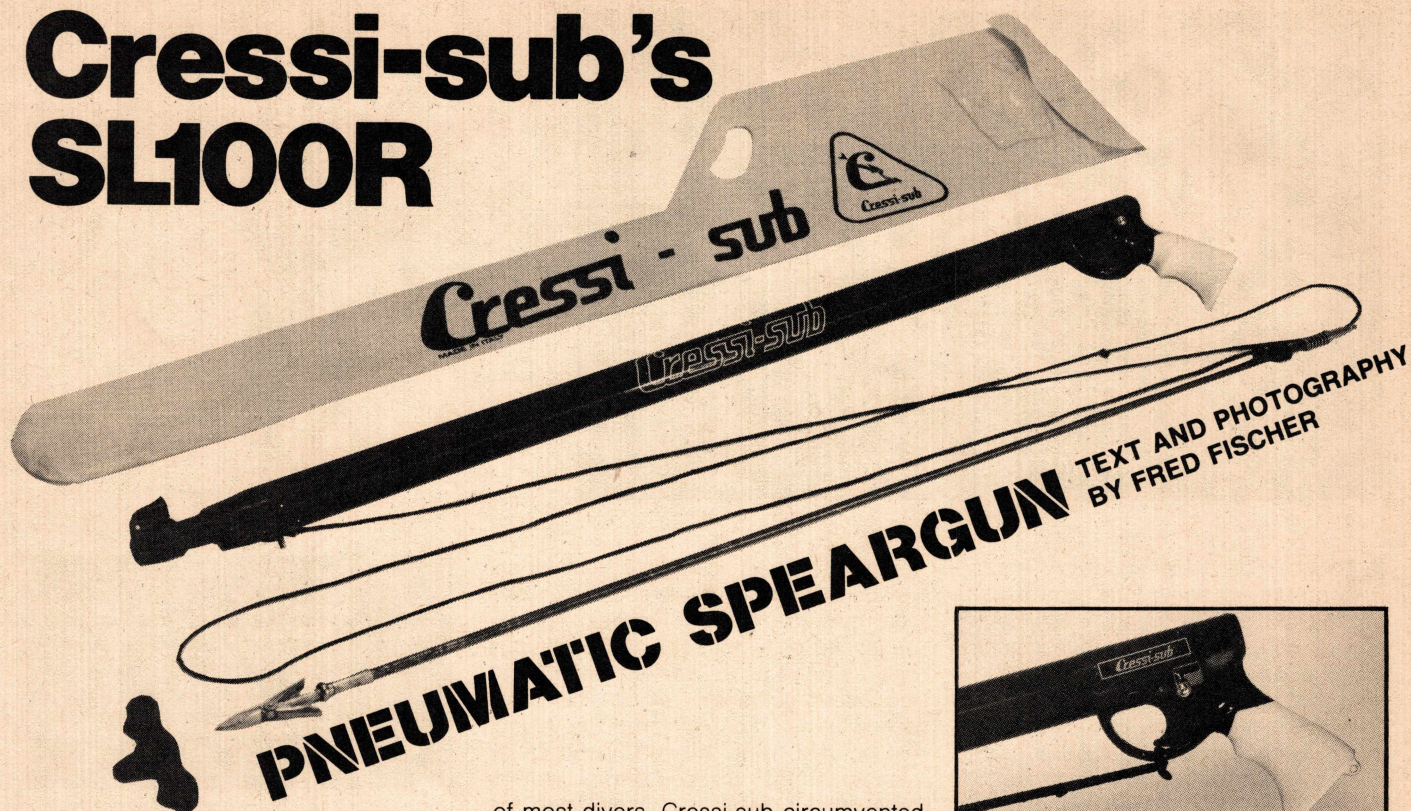
The *Miztec* lies in 45 to 50 feet of water on a sandy bottom. Visibility is excellent; the white sand reflects light nicely. The wreck itself is broken and scattered, but many pieces of hardware are visible. The bow section is still fairly intact and pointed toward Whitefish Point, as if the *Miztec* was still trying to find a safe harbor. The wreck becomes much more scattered as you head toward the stern. Amidships and beyond, the *Miztec* fades into the sandy bottom.

We discovered the anchor still on the wreck, lying in the sand with its flukes jutting upward. Portions of the anchor chain rest upon a broken part of the decking. One of the most exciting finds was the apparent remains of a storage compartment. We found numerous wooden block and tackles of all sizes. Aside from a little rust they looked ready to use. Nearby were a number of tools, including a shovel (it seems that one finds a shovel at just about every wreck in this area). A short distance from the blocks was an old hand-operated bilge pump, standing upright in the sand. We discovered numerous other tools amid the broken timbers. Perhaps our strangest find was an old leather shoe—the question always pops into your mind, "I wonder if its owner is down here too?"

Unfortunately, our time on the wreck was too short. Besides running low on air, we had a storm brewing. If Great Lakes diving teaches you anything, it is to have respect for her storms. They have sent a lot of tonnage to the bottom. I am sure that there are many more items buried in the sand and we hope to return to the site and attempt to discover if any of the stern remains unburied. The location of the *Miztec* is now under the supervision of the Great Lakes Shipwreck Historical Society. The society was formed to document and protect the wrecks of the Whitefish Point and Whitefish Bay area. Hopefully such protection will save the wreck from being plundered by souvenir seekers. As nice as one of the block and tackles would look in my living room, it looks much better on the wreck. 

BY KENNETH E. JOHNSON

Cressi-sub's SL100R



It is hard not to fantasize just a little about spearfishing along the Italian Mediterranean when reading the Latin inscriptions found in Cressi-sub product literature. From Italy, where spearfishing is a national sport, come a large number of spearguns and the majority of *fulci oleopneumatici* (compressed air spearguns). Cressi-sub manufactures some of the finest and accounts for no less than 13 models.

I recently had the opportunity to evaluate the new Cressi-sub SL100R pneumatic speargun. This top of the line gun replaces the older and slightly less powerful SL95. Features include a high volume air chamber, dual stage power reducer and a 100 x 0.8 cm shaft fitted with a twin barb rock point tip. It is ideal for open water use and going after some of the larger reef fish.

"Well, just how much air does it use? Is it connected to your tank or does it use CO₂ cartridges?" inquired one seafood enthusiast who had pulled latex rubber bands all of his life. I explained to him, as I have to many others, that the SL100 and guns like it do not consume any air. The pneumatic speargun is built like an air filled shock absorber with an internal pressure of 300 to 450 psi. To load the gun one must drive a piston from the muzzle to a click stop at the rear of the barrel, using the shaft to push the piston backward. The force required to do this can be considerably greater than the usual 80-100 pounds needed to pull a single rubber sling and well beyond the strength

of most divers. Cressi-sub circumvented this problem by incorporating a dual chamber pressure reduction system into the SL100. By shifting a small lever on the handle to the low pressure or loading mode, the loading force is decreased, making it much easier to push the spear shaft into the barrel. When firing the gun the lever is pushed into the high pressure position and the chamber's full pressure ejects the arrow.

The SL100 is manufactured with the high precision necessary to make it operate properly. The muzzle and grip are tough nylon and the barrel, black anodized aluminum. The steel spear shaft, which has a 7 mm thread, is cadmium plated for corrosion resistance. Since it is essential that only straight shafts be used for good performance, it is recommended that the special spring stainless steel spear be purchased (\$36) as an accessory. The grip is convenient for both right and left handed spearfishermen. The status of the unmarked safety, however, is anyone's guess. The 11 foot shock cord requires only two wraps and runs close to the barrel to minimize snags. For best results a stretch segment should be added to the 1/8 inch braided nylon cord.

The SL100 is shipped with the air chamber pressurized. A handpump is included so the chamber can be pumped to any desired pressure. The maximum pressure is really limited by how much force the individual spearfisherman can exert when loading the gun. The higher the pressure the greater the range and penetration of the shaft. Any loss in power of the gun owing to depth can be offset



A lever on the SL100R handle switches the gun to the low pressure or loading mode.

by pumping the chamber to higher pressure before diving.

In actual use the quick loading of the SL100 is immediately apparent. Owing to the length of the gun the handle must be placed on top of the foot rather than against the hip when pushing the shaft into the barrel. The overall buoyancy is negative and once fired the body floats above the shaft. Aiming is accurate, direct and comfortable. Because the grip is at the end of the barrel the gun becomes an extension of the arm. As with any pneumatic gun there is the problem of what to do with the shaft when it is not in the barrel. Most divers bundle barrel and shaft together with the shock cord. In addition, Cressi-sub provides a combination muzzle cap/spear tip protector to help hold the shaft and barrel parallel.

To maintain the SL100 properly it is essential it be washed with fresh water before storing it vertically, muzzle down. This keeps the oil in the barrel over the main O-ring. Use of bent shafts is forbidden. If trouble develops, protection may be provided by the one year warranty against manufacturing defects.

In conclusion, the Cressi-sub SL100 pneumatic is a medium weight speargun most serious spearfishermen should be pleased to have as a hunting companion. It is powerful, accurate and fast loading. For more information visit your Cressi-sub dealer. Suggested retail price for the gun, handloader, pump and vinyl carrying case is \$188.

Cobra Wetsuits

Custom Made For Warmth,
Comfort and Style

BY MARTY SNYDERMAN



No question about it, divers are an equipment conscious group. Our safety and pleasure depend upon it. And, when it comes to pleasure and comfort, the focal points of our sport, no piece of gear affects us throughout the diving day as much as our wetsuit. This is especially true in temperate and cold water diving. The cooler the water and air temperature, the more demanding the diving conditions and the more crucial the design, fit and function of a wetsuit become. Even on days with ideal conditions, it is simply easier to have fun when you are comfortable. For these reasons, many experienced divers buy custom wetsuits. Such suits, cut for individual body contours, provide better thermal protection and a more comfortable fit when compared with most standard cut suits.

For divers in the Southern California area, a new manufacturer of custom wetsuits, Cobra, is making a significant impact on the diving scene. In Santa Monica, Cobra produces 1/8, 3/16 and 1/4 inch custom suits for both men and women. These come in a variety of styles: a full body one-piece, a farmer john and a waist high pant with jacket. All are available in nylon one, nylon two, Lycra one or Lycra two.

The moment I saw the Cobra suit sent for evaluation, I was impressed with the look. It was stylishly attractive. The pride of custom workmanship was evident in all phases of design and in the labor involved. All the pattern cuts appeared to be exceptionally clean, the seams looked durable and there were no loose thread ends. The color combination was pleasing to my eye and the suit truly had a look and feel of quality. Cobra's fashion-conscious flair is apparent in the high waisted French cut utilized on its women's suits.

But a wetsuit's looks can only take it so far when it comes to satisfying the demands of Southern California divers. Cobra suits are made only from the highest grades of rubber available. All are built from Rubatex GN231 Lycra, softer Ruba-

tex or 6.5 mm Chugai Lycra from Japan.

Cobra guarantees all seams for one year from the date of purchase. Any experienced diver will tell you a wetsuit is only as good as its weakest seams and the Cobra guarantee reflects the confidence the staff has in its products. A double bonded nylon thread is used on all seams and they are double glued for increased durability. The inside lines are taped at all pressure points, where the seams join, for added strength and to prevent chafing. A diamond crotch design helps minimize seam stress.

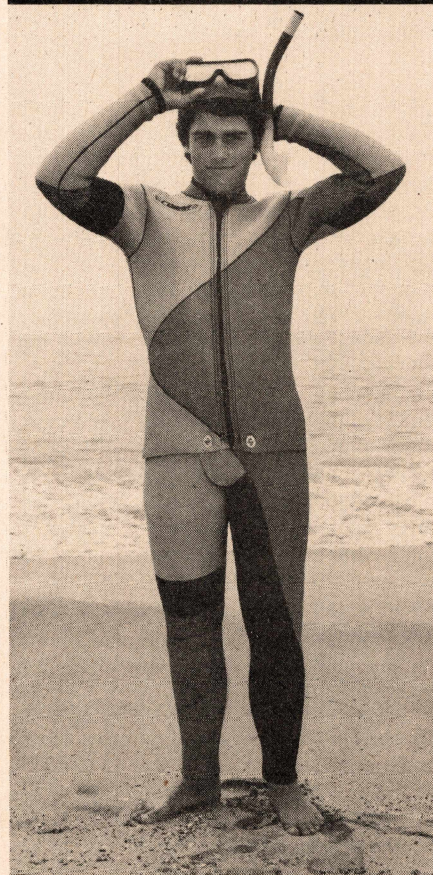
The collar, as well as wrist and ankle cuffs, are all hemmed with a separate strip of highly elastic neoprene. The stretchy binding yields added life and still allows the user to doff and don the suit with ease. Blindstitching is employed on the neck and cuffs to minimize chafing.

Most Cobra wetsuits come standard with a front zip, but a lateral chest zipper is generally used on men's farmer johns. Wrist and ankle zippers can be added upon request. All zippers are heavy duty, nylon YKK models.

A fundamental part of the Cobra philosophy centers around its ability to customize products to satisfy customer needs. By working within the limits of Cobra's body form patterns, the staff will help you create and design a custom suit that is truly one of a kind. You can have your choice of 17 colors ranging from traditional navy blue to hot pink. While a standard price list is available, individual arrangements can be made for those who choose to design their own suits. If you dive in Southern California and are considering a custom wetsuit, pay a visit to Cobra. You can drop in during working hours or make an appointment if you prefer. In just 7 to 10 days the company can put you in the wetsuit you have always wanted. Prices for one color 1/4 inch suits vary from \$289 for a one-piece to \$329 for a French cut, farmer john and jacket.

For further information contact: Cobra Wetsuits, 3013 Ocean Park Blvd., Santa Monica, CA 90405; (213) 452-6386.

Cobra specializes in colorful, custom wetsuits. Working with Cobra personnel, divers design their own wetsuits. These can be crafted in 1/8, 3/16 or 1/4 inch nylon one or two, or in Lycra one or two and in a variety of styles.



photos/Bonnie J. Cardone

Zodiac Mark IV

HEAVY DUTY

Comes with an unusual array of deluxe features not usually found in inflatables

TEXT AND PHOTOGRAPHY BY ERIC HANAUER



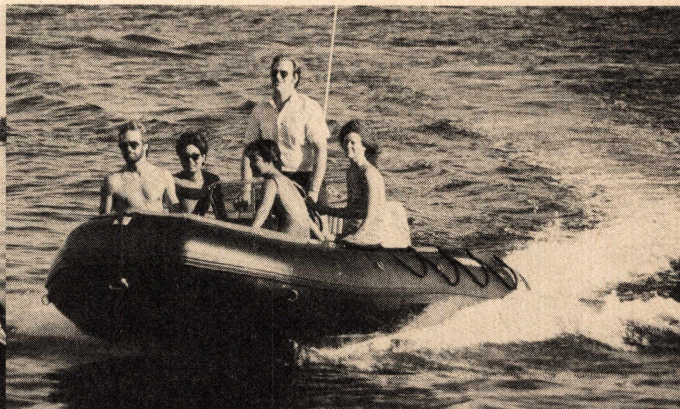
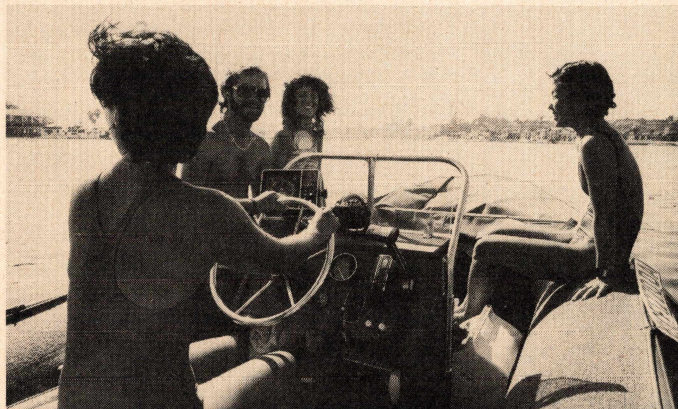
Every once in a while it's nice to forget practicality and dream a bit. Suppose you had an unlimited budget and decided to set up the ultimate inflatable dive boat. You would begin with a rugged commercial hull design and add all the accessories needed for comfort and safety on long trips over open water. Then you would add a few more that you don't really need, but are nice to have. Scott McIntosh of Port-a-Marine, Costa Mesa, California decided to do just that. He took a Zodiac Mark IV Heavy Duty commercial

bucks, but it buys a lot of boat.

The 17'5" hull is new to Zodiac's Heavy Duty line. Its shortest commercial boat used to be the 19 foot Mark V. But for 1984, the Mark IV hull was upgraded from the Grand Raid series to Heavy Duty. There is a lot more to it than just the name change. In fact, the Mark IV Heavy Duty is a brand new boat.

Its base fabric is 1,680 denier Kevlar, the material used in bulletproof vests. It is stronger and stretches less than nylon. It is coated with the traditional neoprene/

form lifting planes. The result is a deeper V configuration with three keels or lifting surfaces. Air flowing under the boat between the tubes provides a suction effect, making the boat handle like a cathedral or a tunnel hull. We tested the Zodiac Futura Mark III and were extremely impressed with its handling, reporting the results in the May 1983 issue. When compared with a wooden keeled boat, those with inflatable keels generally tend to bounce more in swells and skid more on turns. But, the Futura handled better



The Zodiac Mark IV Heavy Duty inflatable features the Futura hull which results in a deeper V configuration, with three keels. Thus the boat handles like a cathedral hull. The version tested for this article (from Port-a-Marine, Costa Mesa, CA) had many extras, including a full complement of instruments and indoor-outdoor carpeting over the floor and pontoons.

boat and outfitted it with all the goodies available from the manufacturer, plus some items he had built himself. The result, our test boat for this month, will take six to eight divers anywhere they want to go in comfort, with a touch of panache.

Let's get reality out of the way first. As tested, the price is \$12,500; \$7,000 of it goes for the boat itself, the rest for the engine and accessories. That's a lot of

Hypalon material. In an era when Zodiac has moved to plastic materials in its sportboats, the commercial models are still made entirely from rubber.

The Mark IV, like all Zodiac's Heavy Duty boats, has the Futura hull. There are two small shock absorbing tubes in the angle between the hull bottom and the two main buoyancy chambers, linked to the big tubes by narrow fabric strips that

than most wooden keel vessels. At the time I wrote, "I couldn't get it to skid, even running flat out. I tried things I wouldn't try with any inflatable boat and with few rigid hulls, but the Futura took it in stride."

Remembering the virtues of the Futura, I was anxious to test its bigger cousin. The Mark IV Heavy Duty is an impressive boat, even in its bare bones form. Its rein-

IMPERIAL'S Superlight Drysuit

Take This One Along For A Super Cozy Dive

TEXT AND PHOTOGRAPHY BY BONNIE J. CARDONE

There is a new generation of drysuits today that are lightweight, do not restrict movement, are comfortable and warm. They are as close to being completely dry as I ever expect a "drysuit" to be. And, by varying the type of undergarment worn you can use the same suit for both cold and warm water diving.

Imperial's SuperLight is one of these new drysuits. It consists of a durable, 420 denier nylon shell with three coats of urethane (for waterproofing) on the inside. The knee areas, often much abused, are protected with two layers of material. There is a heavy duty shoulder zipper with brass teeth and pull. The neck and wrist seals are flexible latex rubber. You can get the suit with either latex ankle seals or attached latex boots. The diver wears neoprene booties over the at-

tached boots for warmth and protection.

All seams on the SuperLight are chain-stitched, taped and welded to protect the watertight integrity of the suit. As with traditional drysuits, the SuperLight has a power inflator which attaches to the regulator with a low pressure hose. The Imperial inflation valve, however, has a positive latch which locks the hose securely to it. The inflation valve is usually on the chest, but you can have it placed where it is most convenient for you.

To deflate the SuperLight you merely press the center of the dump valve on the upper left arm.

Since the nylon shell provides waterproofing but not warmth, the type of undergarment worn with the SuperLight determines its suitability for cold or warm water. For tropical diving you might wear

a sweatshirt and pair of jeans or tights. For cold water diving there are different weights of underwear. For California's temperate waters Imperial sent a lightweight, one piece garment of 17 ounce acrylic fleece. It has a sturdy YKK Delrin zipper up the front and instep straps to keep the legs from riding up while donning the suit. It is all one thickness, non-bulky, fits quite snugly and has no buoyancy of its own. It does not trap air nor add to the buoyancy of the suit. And, even when damp, it kept me warm.

One of the advantages of the nylon shell drysuits is that they are very easy to pack: They take up little space and weigh very little. They dry quickly so if you take one with you on your tropical vacation trip you will probably be able to take it home dry even if you make a dive a couple of hours before you leave for home. These suits are also very easy to put on and take off. I needed help only with the zipper. The SuperLight was not totally dry: There was some water leakage at the wrists and under the inflation valve. I suspect the wrists leaked when I jumped off the boat into the water and air was forced out the seals. There was no leakage on some dives, perhaps because I was more careful about purging air from the suit before jumping in.

Although there are numerous advantages to the new drysuits, there is one thing about them that takes some getting used to: They are very buoyant. Because these suits fit loosely they trap air inside. And, the thicker the undergarment the more buoyant you will be. No matter how many years you've been diving, when wearing one of these suits for the first few times, descend and ascend along an anchorline. I added seven pounds of lead to my weightbelt and wore three pound ankle weights. With this extra ten pounds I was neutrally buoyant in the SuperLight. I kept a finger on the dump valve while ascending, venting air almost continually. Leaning back slightly so the air in the suit rises to the valve is also helpful.

Care of the SuperLight is easy. Rinse with freshwater and let dry out of direct sunlight. Keep the zipper lubricated with beeswax and do not allow it to become bent or kinked. Dust the latex seals and booties with talcum powder.

The Imperial SuperLight comes in royal/red, navy/royal, royal/yellow or navy in extra small, small, medium, large, extra large and super extra large. The underwear is available in the same sizes in three different weights; 30, 23 and 17 ounce. Suggested retail price for the suit, with valves and low pressure hose, is \$624. The underwear ranges in price from \$74 to \$138.

Imperial also makes a full line of accessories including neoprene hoods, booties and gloves. For more information see your Imperial dealer or contact: Imperial Manufacturing Co., P.O. Box 4119, Bremerton, WA 98312. 



The SuperLight drysuit is made of nylon, waterproofed with urethane on the inside. This makes it lightweight, comfortable and easy to pack. The SuperLight is entered through a waterproof zipper across the back of the shoulders. Neck and wrist seals are stretchy latex rubber. The undergarments worn by the diver provide insulation.

ZODIAC MARK IV

forced anodized aluminum floorboards are covered with gray nonskid paint. A new system of stringers makes the floorboards easier to assemble while providing the necessary rigidity. Of course, a boat this size will be trailered, so that is not as important a factor as it would be on a smaller boat, which will spend more of its career folded up. Five tubes make up the hull, inflated by Zodiac's patented interconnecting valve system. This is in addition to the three keel tubes. Since one person would spend an inordinately long time inflating the boat, two foot pumps are included as standard equipment. Also standard is a large repair kit, a 75 foot towing sling and plenty of D-rings for lifting eyes or for attaching gear.

Starting with the basics, McIntosh customized the Mark IV with an imposing array of extras. Most of the goodies are clustered in the teak center console. It's got a steering wheel and engine controls, including power tilt for the 75 horsepower Suzuki engine. Topped by a spray shield and a stainless steel grab bar, the console houses a full complement of instruments. These include a compass, ta-

chometer and engine hour meter. There is a VHF radio on a shelf below the gauges. But the *pièce de résistance* is the Graduate 301, a seagoing version of 2001's HAL. At first glance, the Graduate looks like just another electronic depth sounder. But it also includes a temperature gauge and a speedometer. All have

ZODIAC MARK IV HEAVY DUTY

Overall length	17'5"
Inside length	9'2"
Overall width	7'
Inside width	3'5"
Tube diameter	22"
Chambers	5 plus 3 inflatable keels
Material	Kevlar/neoprene/Hypalon
Floorboards	Aluminum
Weight	330 lbs.
Maximum payload	3080 lbs.
Capacity	12 persons, 6-8 divers
Maximum horsepower	80
Color	Black
Price	\$7,000

LCD digital readouts and all can be operated and read simultaneously. There is even an alarm, which can be preset for a given depth. According to McIntosh, "It's got all the bells and whistles."

The console is fastened to the floorboards, which are covered by heavy duty

indoor-outdoor carpeting. The carpets, custom designed for this boat, also cover the pontoons. Since the Heavy Duty series comes in any color as long as it's black, the cool gray carpet provides more comfortable seating on a hot day.

There is plenty of room for people and equipment. A padded driver's seat is large enough for two and provides storage space underneath, as well as room for twin batteries. We stowed three scuba tanks behind the seat and could have easily put in three more. The normally open bow had a custom nylon cover, which could be snapped on or off in minutes. Its steel frame kept it high enough in front to provide plenty of dry storage.

We took the Mark IV out of Newport Harbor during Southern California's late summer heat wave, with a light wind chop coming out of the west. The 75 horsepower Suzuki engine was near the boat's rated maximum of 80, but a company spokesman calls that an extremely conservative figure. Six passengers and three sets of dive gear constituted the load. It's rated for 12 persons, but six divers would be the limit in its present form. With the console and seat removed, two more could be accommodated.

Only two-thirds throttle was required to bring the vessel up on a plane. It came up level instead of bow first, thanks to the Futura hull. Once up, only half throttle

(Continued on Page 112)

THERE IS NO OTHER DIVE BOAT LIKE IT IN THE WORLD



THE COUSTEAU SOCIETY EXPEDITION CHOOSES ZODIAC for its dive boats. The reason? ZODIAC is the world's most technologically advanced inflatable.

THE FUTURA HULL brings new excitement to inflatable boat performance. The addition of secondary inflation tubes gives the FUTURA unprecedented maneuverability and increased payload.

THE INTERCOMMUNICATING VALVE allows single point inflation, balanced pressure, and extra safety.

ANODIZED ALUMINUM FLOOR BOARDS are rugged enough for divers and their equipment. They are lighter, easier to assemble, and are maintenance-free.

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ICE DIVING FOR SCALLOPS

Maine's Winter Inshore Scallop Season— Adventurous New Career For Divers

TEXT AND PHOTOGRAPHY
BY GREGORY S. STONE

The half hour passed quickly. Time always does when scuba diving. Without even looking at my watch I knew I was near the end of my tank because I began to shiver. Sixty feet above me was a cold December day with snow-covered shorelines and a 25°F air temperature. Looking around at the starfish, frilled anemones and seaweeds gave no hint of the stark winter day above. Marine life is amazingly resilient and thrives throughout the year. Only the frigid seawater running through my wetsuit assured me I was, indeed, on the bottom of Blue Hill Bay during Maine's coldest season.

I picked up one last scallop and after carefully placing it in my catch bag began my ascent. At 15 feet the glassy surface of the water came into view. Ten feet away was the hull of our Boston Whaler.

Ben saw me coming from the clouds of bubbles erupting in the bay. He looked right at me as my head cleared the water and I knew he'd be disappointed with the small catch. I removed the regulator from my mouth and called out, "Only about 12, Ben. Let's try another area."

For ten minutes, while traveling to a new site, I had a chance to warm up. It was hard getting back into the water. It numbed my face, stinging me, filtering into my wetsuit and chilling me all over again. But soon I adapted—it wasn't so bad as I settled onto the seafloor—and I was surrounded once again by an enchanting submarine world.

I started scalloping in 1982 while a student at College of the Atlantic in Bar Harbor, Maine. I had a fairly good understanding of marine biology and was a

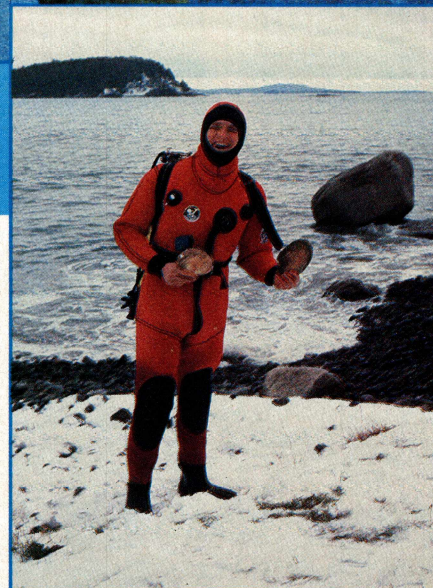


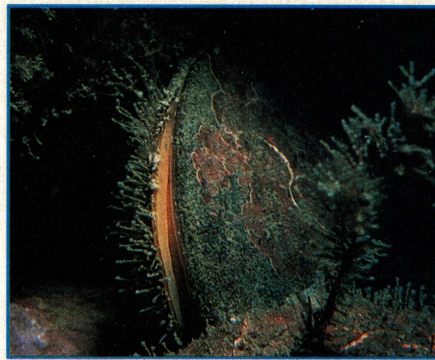
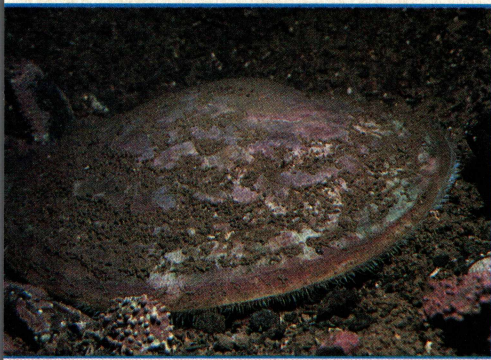
Maine's scallop divers must brave snow, ice and freezing water to collect their prizes. It's hard work and to be successful the scallop hunter must know the best areas to search for the valuable mollusks.

scuba diving instructor. With a love for seafood and impending college bills, my circumstances pointed decidedly at scallop diving.

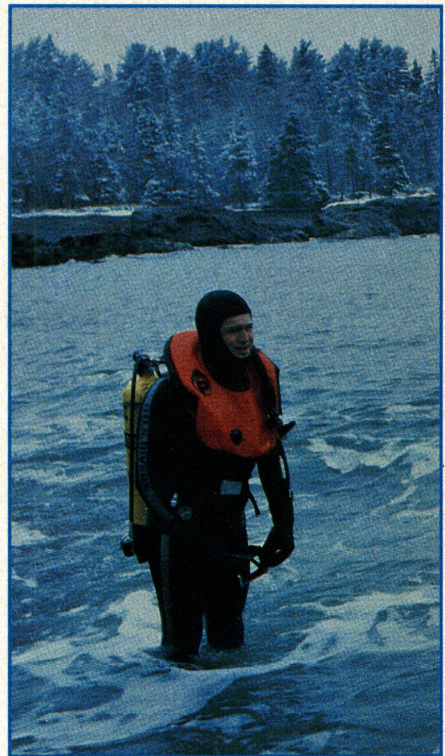
On November 1, I bought my first license for \$50. This was the beginning of the annual inshore scallop season which would extend until April 15. With my license in hand and scuba equipment in my car all I needed was a good scallop bed. I dreamed of paying all my bills and regularly eating broiled scallops.

I enlisted the help of a fellow diver, Ben





Clockwise from top: It takes a trained eye to pick out scallops underwater as their natural coloring blends into the ocean bottom. The adductor muscle (white meat in middle of open shell) is the only portion of the scallop that is commonly eaten in the U.S. Thus the price per pound is for this meat only—the shells are useless weight. A hearty meal of scallops can make braving the cold seem worth it.



Baxter, who, like me, was looking for some extra income. Ben worked as a whale watching guide in Newfoundland during the summer and had just learned how to dive.

The first stop on our quest for scallops was Blue Hill Bay off Mount Desert Island. We were looking for the giant sea scallop, the most common species along the coast of Maine.

I knew sea scallops preferred depths of more than 30 feet and a sand or pebble covered bottom. By studying nautical charts of the area we learned that Blue Hill Bay fulfilled both requirements. We set off early one November morning in a borrowed 16 foot Boston Whaler for the presumed scallop beds of Blue Hill Bay. We were confident we'd soon be weighing out our first big haul of scallop meats.

In good areas it's like picking freshly fallen apples from the ground of an orchard. Scallops are free swimming shellfish that rest on the bottom when not mi-

grating or escaping predators. Fortunately, adult scallops have no fear of divers. When approached, they simply close up their shells and remain motionless, perhaps hoping not to be noticed. Baby scallops, on the other hand, have sensitive escape behaviors and frantically clap their shells together as they jet away from the diver. If the scalloping is good a diver can collect 30-40 pounds of scallop meats in a day; with the dockside price varying between \$5 and \$6 per pound this can amount to more than \$200.

Five tanks of air and 12 hours later, we realized that scallops apparently require more than a certain depth and bottom type. We hadn't the foggiest idea what the other requirements might be. Most of the areas in Blue Hill Bay were scallopless. We barely collected enough to feed both of us dinner.

We continued to scallop dive for the next two months until the icy winds and frigid waters of January inspired us both

onto more comfortable activities. We had not made any money, maybe enough to pay for our air and gas, but a foundation was laid for a working knowledge of scallop diving that was to pay off in the next two years.

Ben never dove for scallops again. But I upgraded my equipment for cold water diving and, with other divers, eventually began to find scallops. Because knowledge of a good scallop bed is as good as money in the bank, the locations of these areas are some of the best kept secrets in the state of Maine.

Scallops belong to a group of filter feeding shellfish called bivalves, those having two valves or shells. Their closest cousins are clams and mussels. All three feed by filtering plankton from seawater. Scallops tend to like areas where there is a lot of water flow because this provides more available food to filter. I learned good areas for scalloping were around jetties, entrances to bays, or any other

(Continued on Page 103)

Danger In Paradise

Cone Snail Collecting Demands Caution

TEXT AND PHOTOGRAPHY BY ALEX KERSTITCH

Cone shells are carnivorous marine snails, distributed throughout tropical and subtropical seas. Known as toxoglossans (or poison tongues), these gastropod mollusks have developed an awesome apparatus for stinging and capturing their prey. Feeding primarily on small fish, worms and other marine snails, cones capture and paralyze their victims with an arrow-like harpoon filled with potent venom. Like the blowgun hunters of the Amazon, a cone stalks its unsuspecting quarry with a long elastic tube armed with the deadly dart. At close range the needle sharp arrow is ejected, penetrating the soft body of the victim. Within seconds the paralytic venom immobilizes the prey, which is engulfed whole into the cone's distended mouth.

The lethal barbed spear is actually a modified tooth known as a radula. In nearly all gastropods the radula apparatus consists of a horny ribbon bearing rows of hooked teeth used for scraping food material from hard surfaces. But in cones the radular teeth have evolved into hypodermic-like needles, barbed at the tip. The shape and size of radular teeth vary considerably among cone groups. Some are long, slender and strongly barbed at the tip, whereas others can be short with weak barbs. The stinging arsenal consists of several radulae held in reserve in the radula sac. As many as 75 may be present in some species. When one is discharged another is transported to the tip of the elastic tube (proboscis) ready for firing.

The venom is a protein base neurotoxin produced in a thin, serpentine duct, reaching more than two feet in length in larger species. A kidney-shaped bulb connected to the duct functions as a pump by forcing the venom through the duct into the hollow radula.

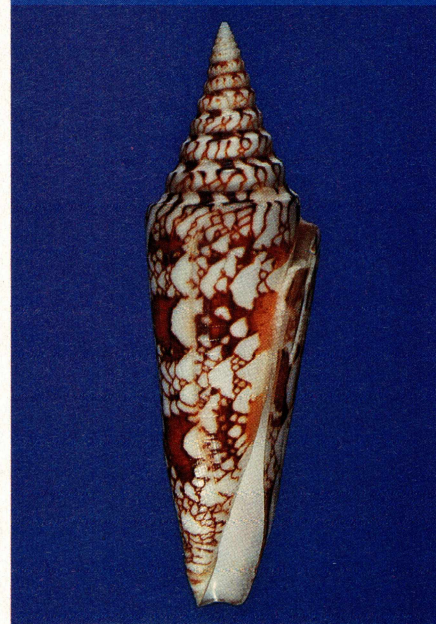
In recent years, marine toxicologists have investigated the nature of the venom from several dangerous species. It was discovered that the toxic components in the venom are proteins, known as peptides, which produce paralytic effects on test animals. Venom studies of *Conus geographus* indicate that the toxin affects the junction between the muscle

and nerve causing muscle paralysis. Test mice injected with this venom experienced convulsions and paralysis of limbs, followed by death from respiratory failure minutes after envenomation.

Based on food preference, cones can generally be divided into three groups: (1) Molluscivorous cones, such as *Conus dalli*, which feed exclusively on mollusks, including other cones; (2) Vermivorous species whose diet is restricted to worms; and (3) Piscivorous cones, such as *Conus geographus*, which prey exclusively on small fish. The potency of the venom varies between each group and among species. All of the 350-400 species are venomous but their toxins are directed at affecting specific preys. The



Left: *Conus geographus* crawling on sand, Vanuatu. This is an extremely venomous species. Above: *Conus gloriamaris*, Cebu, Philippines. Below: The valuable *Conus milneedwardsii*.



venom of a fish eating species, for example, is usually not effective against worms or mollusks; molluscivorous cones cannot paralyze fish or worms. Cones such as *Conus brunneus*, a vermivorous species, are highly specialized in their food preference; they do not select any species of worm indiscriminately. Equipped with an ultrasensitive chemical sensor for locating prey, they seek out only the bristle-bearing fire worms. In contrast, molluscivorous cones are less specialized. *Conus dalli*, for example, will prey on a variety of mollusks, even other cones.

Piscivorous species, particularly *Conus geographus*, are responsible for



The series of photos above and below show *Conus purpurascens* preparing to sting a goby, beginning to feed on the fish, engulfing the fish and finally digesting the completely engulfed animal. Bottom left: A close-up of the radula tooth extended from the proboscis of *Conus purpurascens*. Bottom right: Handle cone snails as far from the proboscis as possible—gloves are better.



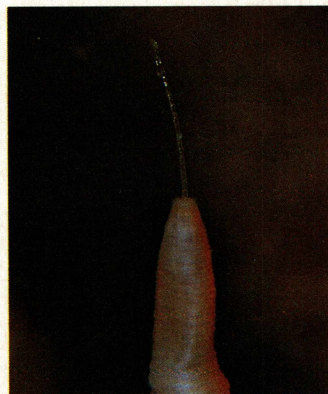
most serious human injuries and fatalities. But one molluscivorous cone, *Conus textile*, has been implicated with at least one fatality. Although the venom of vermivorous cones is not considered lethal to man, some species could be potentially dangerous because of their large size. One of the largest vermivores, *Conus betulinus*, can reach seven inches in length and can produce a comparatively large quantity of venom.

Victims of cone stings experience a variety of systemic effects. Mild cases may result only in a burning rash or blurred vision, lasting less than an hour. Serious stings, however, can involve nausea, convulsions, tissue necrosis and flaccid paralysis of the limbs lasting for weeks. Respiratory and cardiac arrest follow in fatal cases. A common complaint by recovering patients is the constant presence of extreme weakness. Since there is no efficient antivenin against cone venom, treatment is largely symptomatic, di-

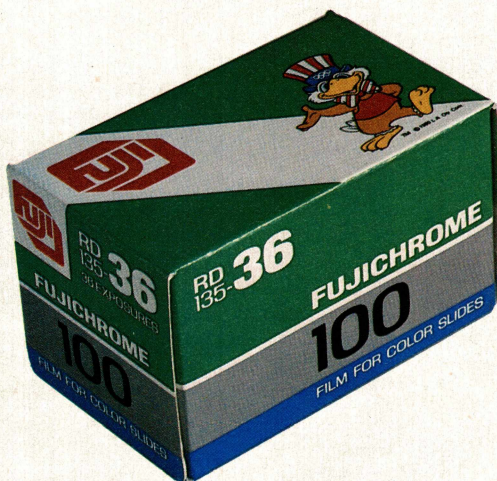
rected at relieving pain and halting the deleterious effects of the poison.

Stings are usually the result of careless handling by shell collectors. Although most species retract within the shell when handled, some remain active shortly after

collection and may become aggressive. *Conus textile*, responsible for at least one confirmed human fatality, is particularly active and aggressive after collection. Such animals should not be handled without gloves. 



Dive Testing FUJI 100 COLOR FILM



**TEXT AND PHOTOGRAPHY
BY JIM AND CATHY CHURCH**

Would you like to simplify your U/W photography by using the same film for macro, close-up, normal angle and wide angle as well as your topside shots? If so, Fujichrome 100 may be for you.

Once you have calibrated your exposure meter, worked out your strobe exposures and developed a "feel" for what this new film can do, you'll make fewer mechanical errors. You will never need to change your meter settings, rethink your exposures or try to remember what film is in your camera—you'll have standardized your procedures.

With an ISO (ASA) film speed of 100, Fujichrome 100 is good for either natural light or strobe fill exposures in tropical waters. With a level camera angle in about 30 or 40 feet of Caribbean water, you can expect an average sunlight exposure of about f8 at 1/60 or 1/90 second. Because this is a smaller aperture than you would use with an ISO 50 or 64 film, depth of field is increased by about 50 percent. This is most important when you are using a 35 mm camera and 35 mm lens because this lens has limited depth of field at wide apertures and close distances. Also, because most lenses are sharpest when used with the middle and upper-middle range of f stops, f8 may produce a sharper image at the exact focused distance than f5.6.

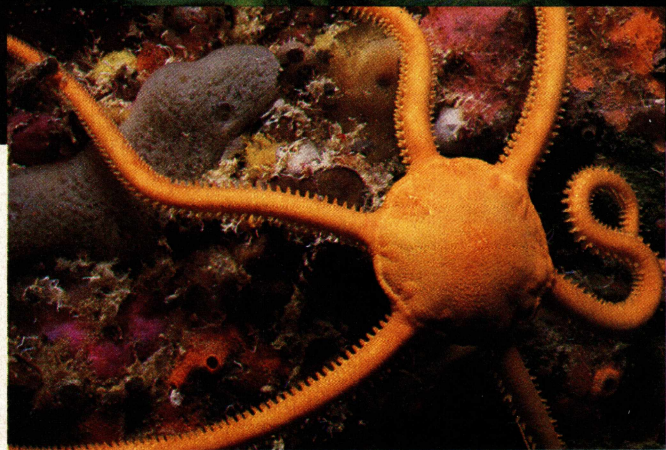
The ISO 100 film speed is also advantageous for close-up and macro photography. With a Nikonos, a supplementary close-up lens and a small strobe, the basic ISO 50 or 64 exposure is usually f16 with the strobe held about one foot from the subject. But with Fujichrome 100, you can close the aperture to f22, which increases depth of field. With a Nikonos and 1:1 or 2:1 extension tube, strobe to subject distance may be only a few inches with ISO 50 or 64 and a small strobe, which may make lighting difficult. But with Fujichrome 100, the strobe to subject distance can be increased by several inches.



If you use a housed camera and a 100 mm or longer lens for macro work, the higher aperture allowed with ISO 100 rather than a slower film can be important. Strobe to subject distances are longer with close focusing telephoto lenses, which means lower numbered apertures, which reduce depth of field, must be used.

You may, of course, prefer to use a slower, finer grain film, such as Fujichrome 50, for close-ups. However, if you load your camera in your hotel room before you board the dive boat, you may not have any idea where the boat is going. With Fujichrome 100, you can switch lenses without having to finish the roll of film. You can take wide angle, normal or close-up shots at any time.

Processing is also important. While Fuji can provide mailers for processing by Fuji, Fujichrome films are E-6 compatible



Top: A wide angle shot with a variety of colors and reflectances including fish, rocks, bluewater background and a diver with flashing strobe. With Fuji 100 film the camera aperture was f8 and shutter speed was 1/90 second, using a 15 mm lens and strobe fill. **Above:** A close-up of an orange brittle star taken with an extension tube at f22, 1/90 second, using a small strobe.

and this process is what most dive resorts use. Thus, overnight processing can be available at many remote locations.

We tested Fujichrome 100 by taking pictures of typical U/W subjects, ranging from wide angle to macro, rather than by taking shots of color charts in a topside photo studio. Our goal was to find what this film could do for us underwater.

The most difficult test was a wide angle set-up with a variety of colors and reflectances and a range of seven or more stops from the brightest to the darkest areas. We used an upward camera angle to include a school of yellow grunts, rocks encrusted with sponges and corals and the bluewater background and surface. Then, we added a diver with a Nikon SB-102 strobe, set for 1/16 power and the slave mode. To prevent the slave from overexposing, we attached the accessory wide angle diffuser with two layers of white cloth beneath.

Using the same Nikonos V camera, 15 mm lens and Subsea

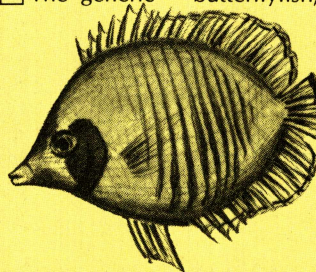
(Continued on Page 106)



The Lemon Butterflyfish

(*Chaetodon semilarvatus*)

The scientific species name for the lemon butterflyfish of the Red Sea, *semilarvatus*, means half masked, in reference to the gray patch over the cheek, or lower half, of the face. This is in distinction to the typical dark marking most butterflyfishes have through the entire eye area—a common characteristic that is said to help camouflage them from predators. The common name lemon is obviously in reference to the predominantly yellow body of the fish, but perhaps a more suitable name might be half-masked butterflyfish, since so many butterflyfishes are yellow. □ The generic name, *Chaetodon* means bristle tooth, a reference to the minute, brush-like teeth of all butterflyfishes, members of the family Chaetodontidae. Ichthyologists have grouped butterflyfishes and angelfishes into the same family because both share the bristle-tooth characteristic, but most scientists now separate the angelfishes into their own family, Pomacanthidae. □ With their brush-like teeth, the butterflyfishes pick their food from the reef, mainly the tentacles of polychaete worms and zoantharians. These fishes are diurnal, spreading over the reefs to feed by day and entering a sleepy state, or torpor, by night. The lemon butterflyfish of the Red Sea is said to be common in the Gulf of Eilat, near the tip of the Sinai Peninsula, but rare in the more northern area of the Eilat coast itself. Divers can easily identify the fish by its bright yellow body, which is sometimes bedecked with orange vertical lines. Also, the gray eye patch is distinctive.



□ Butterflyfishes exhibit important physical characteristics that are vital to their natural means of defense. Almost all of them have some sort of marking through the eye and many have a dark blotch through the tail. It is speculated that these serve as a camouflage and that predators calculating the movement of the butterflyfish by the position of the eye often mistake the posterior spot for the real eye (the real eye being concealed by the stripe). As a result they lunge for the wrong end of the fish. The dark posterior marking of the lemon butterflyfish, however, is confined to a dark rim on the tail. □ Butterflyfishes have other means of defense besides camouflage. The high bodies and stout dorsal and anal spines deny them as prey to all but the largest predators and they can also wedge themselves into inaccessible, narrow cracks in the reef. □ The juveniles of most species of butterflyfishes are prized by aquarists the world over. Young butterflyfishes are generally recognizable to species, although the juveniles may often have an extra spot in the tail region which disappears with growth. The lemon butterflyfish is said to grow to 10 inches. □ Butterflyfishes often swim in pairs, with one racing ahead of the other and the other rushing to catch up. Their movements are butterfly-like, as they flit from one spot to another on the reef. Their tiny, beak-like mouths are well adapted for the eating they do. If they can be enticed to eat out of the diver's hand, they will become quite fearless, confident and trusting. 🐟

Photo By Carl Roessler-Text By Hillary Hauser

Roessler took the photo in 50 feet of water at The Temple, off Ophira in the Red Sea. He used a Nikon F and 55 mm macro lens in a Niko-Mar housing, a Bauer E252 strobe. Kodachrome 64 at f16, 18 inches from subject.

San Nicolas Island lies some 70 miles off the Southern California coast, guarded by sometimes unpredictable weather. Howling winds may approach without notice, churning previously tranquil seas into a raging torrent. Obviously, owing to its distance from the mainland and the increased possibility for foul weather, San Nicolas is not the place for inexperienced skippers.

Such a description hardly sounds inviting, yet it is these characteristics that have left San Nick relatively free from the influence of man. Beneath the sometimes violent surface are unspoiled reefs, inhabited by a host of creatures, none of which seem terribly bothered by approaching divers.

For those used to beach diving or to is-

winds down and the boat slows. The weather on this side of the island can be especially hazardous. Treacherous currents and large swells driven by strong winds can make diving out of the question. For this reason, some areas are marked "foul" on marine charts. But when the weather is down, the diving can be breathtaking. The hard volcanic rock bottom leads to excellent visibility. In one instance, we were diving in an area not more than a few hundred yards from The Boilers, just off the west end. We encountered visibility of approximately 20 feet and the water had a greenish tint. In search of cleaner water, the skipper headed for The Boilers. Much to the surprise of all on board, the water gradually changed from green to deep blue within

those who aren't familiar with what is considered to be a huge sheephead, the record is just over 36 pounds. Members of the group hovering around us looked about 30 inches long which translates to approximately 20 pounds. Needless to say, there is no lack of action, only lack of enough film to capture it.

While the fish life around The Boilers is exciting, to say the least, there are creatures equally exhilarating lurking unseen on the rocky bottom. San Nicolas Island has to be considered among the premier lobster or bug diving spots to be found in Southern California. The Boilers are noted for extremely large lobster—bulls as they are affectionately called by veteran bug divers. Numerous catches in the range of 12 to 15 pounds have been

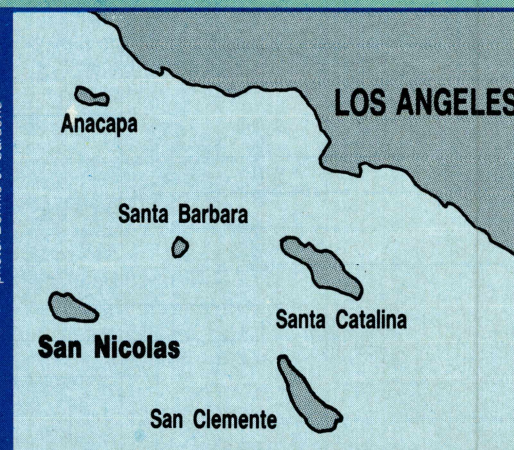
San Nicolas Island

California's Virgin Diving Country



San Nicolas Island lies 70 miles off the coast of Southern California. The distance and unpredictable weather combine to reduce human pressure on the area and the result is fantastic diving.

photo/Bonnie J. Cardone



TEXT AND PHOTOGRAPHY BY ROB FAZIO

lands more frequently visited by divers, San Nick will surely quicken the pulse. The life here is strikingly larger and more abundant. The fish are extremely curious and it is not uncommon to find oneself eye to eye with 20 pound fish.

The journey to the island takes approximately eight hours. Dive charter boats set out from the mainland the evening before the dive. A peaceful way of starting the day is to awake just after sunrise to spend some quiet moments alone out on the deck as the boat nears the island. It is now that the magic of San Nick begins. Besides the rumble of the boat's engine, the silence is broken only by the cries of the sea lions and elephant seals in the distance. Couple this with the pounding surf and the mood is set for some very special times with the sea.

Nearing the west end, the engine

this short distance. As the boat slowed, the bottom suddenly came into view 40 to 50 feet below. Being a photographer, I wanted to be among the first in the water in order to take full advantage of the excellent conditions.

My buddy and I descended through the clear blue water and landed on the rocky bottom. We instantly became the center of attention to the local marine life. To a photographer this is a most welcome reaction. To further enhance the situation, we offered a sea urchin to attract even more attention. Much to our delight, we found ourselves surrounded by as many as five different species of fish. But the stars of the show had to be the pack of huge sheephead that wolfed up the meal in a matter of seconds. The perches, wrasses and kelp bass rushed in to finish off the few scraps that remained. For

bagged here.

While diving an area near The Boilers last year unusually poor conditions hampered photography and my interest turned to my buddy, engrossed in a lobster hunt. With visibility under ten feet and extremely heavy surge, most of the dive was spent being tossed from rock to rock, under which we would check for lobster. On one occasion I came upon a small tunnel. Shining my light toward the back of it I saw a lobster. His only way out was past me. While I do not normally take game of any kind, I found the challenge before me too much. Since I was still burdened with my camera equipment, I was unable to penetrate the opening. I motioned my buddy over. He allowed me to grasp his ankles and slide him into the tunnel. After a few seconds, the appearance of a cloud of sand signaled contact

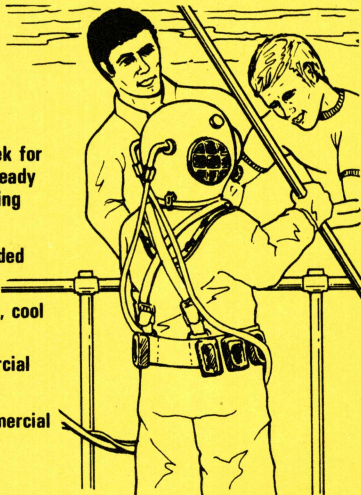


had been made. I reeled my buddy in along with our catch, an eight pound bug—not too bad for a novice.

I wasn't aware of it at the time, but the real challenge was still ahead. After landing our first bug, my buddy practically dragged me to a large pile of rocks. He motioned me to look into a crevice. Much to my disbelief, I was face to face with the largest lobster I have ever seen, in the ocean or mounted as a trophy. The only view we had was head-on, so it was difficult to estimate its actual size. But the head was close to nine inches across and the legs an inch in diameter. You may wonder how we got such a long look at this monster without bagging him. Well, he was trapped against the rocks, just inches out of reach with nowhere to go but into our grasp. For 15 minutes we struggled to capture him, but to no avail.

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SAN NICOLAS

I suppose such stubbornness is how this granddaddy has survived to achieve such incredible proportions.

A popular San Nick area is the more protected waters of Dutch Harbor at the east end of the island. For the photographer it provides calm waters and an endless supply of subjects from which to choose. As with the boilers, the fish in Dutch Harbor are characteristically large and easily approached.

What sets Dutch Harbor apart from other areas is the quantity and variety of life to be seen at one time. It is truly a living fantasy. While descending, one may likely encounter the kelp rockfish hanging motionless in midwater. They are commonly found hovering in a vertical position as if in suspended animation. This unusual posture has led many to nickname the fish the dumb bass. If you gaze out into open water you'll see countless numbers of fish swirling over the tops of the reefs. Blacksmith cloud the sunlit surface waters, while numerous other species such as opaleye, bocaccio, half-moon, surperch and the ever popular sheephead, intermingle en masse near the bottom.

Perched like sentries on the jagged ledges are various species of rockfish. Some, more common to San Nicolas Island, are the gopher, copper, vermilion, black and yellow, the grass and the previously mentioned kelp rockfish. All are curious and characteristically easy to approach. Their large eyes and mouths, fixed permanently into a frown, seem to project defiance as they lie still on the bottom. The only detectable movements are the ever-active eyes, continuously rotating in order to catch any possible danger. Some species attain a length of 30 inches, but most average 18-24 inches. The coloration of different species varies greatly as the names imply and some are nothing short of dazzling.

To this point, all marine life described has been relatively active and quite visible. Yet the observant eye will discover numerous other treasures. In fact, it is quite common to spend entire dives in the general vicinity of one rocky outcropping or section of reef. Strawberry anemones and encrusting sponges decorate the reefs in a beautiful display of color. To best appreciate the many creatures to be found in Dutch Harbor and to view them in their true splendor, it is necessary to carry a dive light. It is then that you will discover a world passed over by many.

A very common creature is the white spotted rose (*Tealia*) anemone. Depending upon its activity, it may be completely retracted and appear to be nothing more than a bright red dome with white spots.

(Continued on Page 107)

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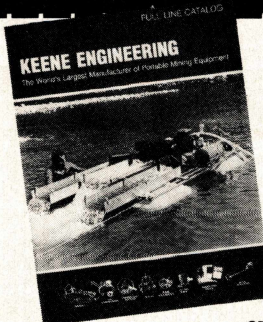
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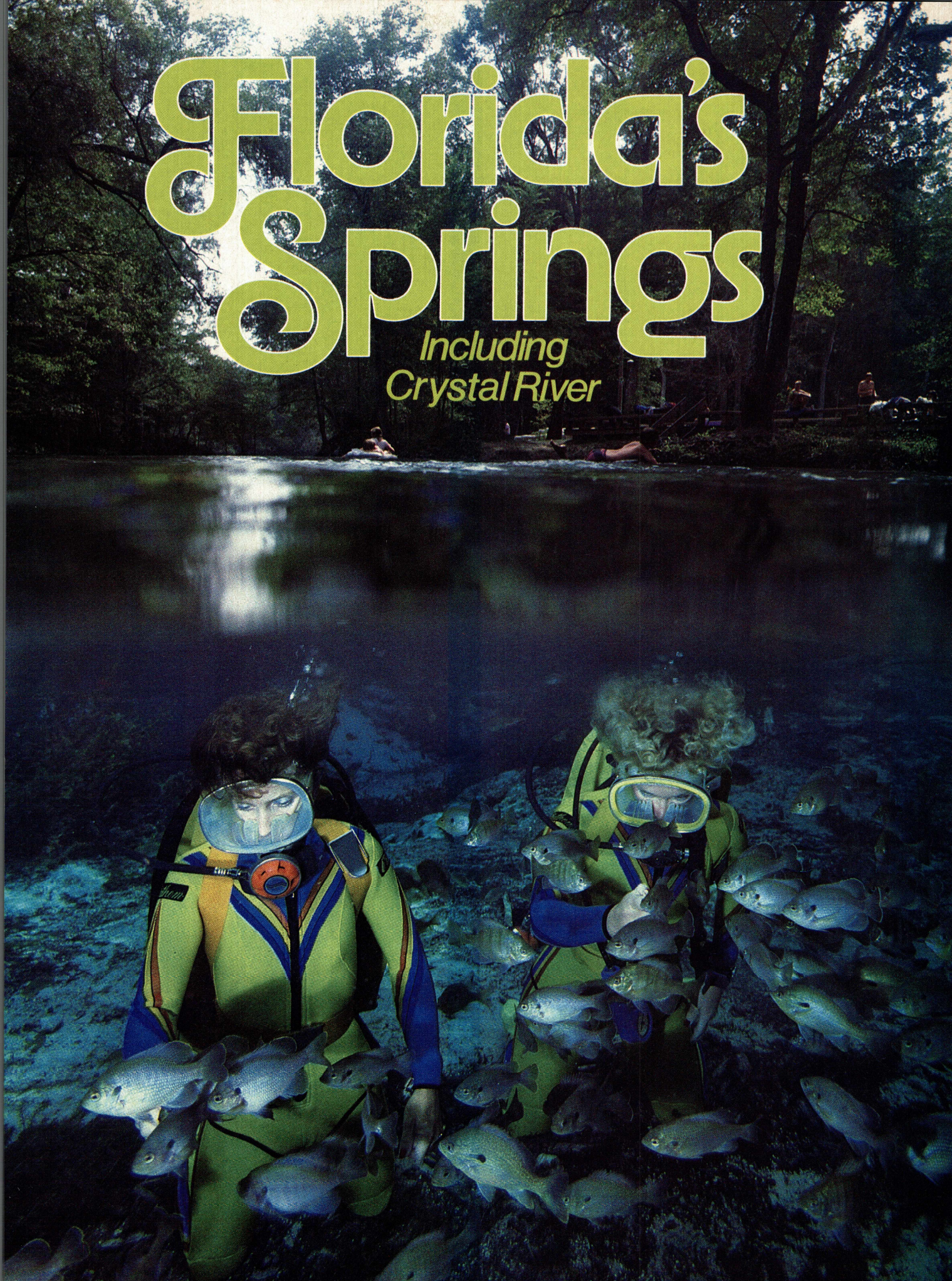
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SD

Florida's Springs

*Including
Crystal River*



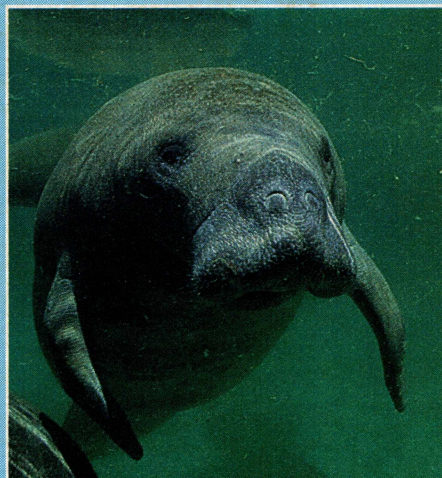
Florida's Crystalline Springs

A Unique Freshwater Diving Adventure

TEXT AND PHOTOGRAPHY BY STEVE LUCAS



Divers load a canoe at Ginnie Springs.



photo/Greg Johnston

Manatees are found in Florida's rivers.



Above: Devil's Eye Spring. **Opposite page:** Janice Lucas (foreground) at King's Spring. A variety of fantastic freshwater diving experiences are available in central Florida and dive operators provide services and tours to the springs. A number of family show parks are found in the area and Walt Disney World, Epcot Center, Sea World and the Kennedy Space Center are only a few hours' drive from the springs.

Savannah darted to the right. Sunrise followed. Together they rolled and played through the maze of fresh and saltwater fish. The sun sparkled and formed star shaped patterns on their backs. The babies hovered momentarily at the surface, slowing only long enough to catch a breath before restarting their unending game of tag. They circled us, stopping to peer at our faces, then dashed beneath us, only to reappear on the other side of our viewing station.

As I stood with my face pressed against the thick glass, I had varied emotions about them. At the same time, I wanted to dive in, yet wished they could be far away from humankind. Born in captivity and recently released, the manatees were now experiencing freedom for the first time. At the head waters of a spring near Crystal River, research scientist Dr. Jesse White of the Miami Seaquarium had carefully placed his charges in the semi-confined safety of the Homosassa Springs Nature World. Flowing from deep underground, the clear spring becomes a river that leads to the nearby Gulf of Mexico. A natural environment, here Sunrise and Savannah can learn the ways of their wild heritage and eventually help to replenish their species: A species of docile behemoths much more plentiful before the introduction of man's machines.

Slow to react to fast moving boats, Florida's West Indian manatee population has steadily dwindled. Endangered mammals, they have little natural fear of humans and in many cases actually seem to enjoy our company. Lumbering just beneath the surface, the aquatic giants seek the winter warmth of the rivers and streams that flow out of the ground and into the ocean. These same placid rivers and streams make excellent year-round playgrounds for swimmers, boaters and divers on Florida's upper west coast.

At King's Bay, the beginning of one of the most popular of these recreational waterways, the animal has found an area ideally suited for its survival when the ocean becomes cold. Almost completely surrounded by the city of Crystal River at its head, the wide stream is fed by half a dozen or more springs, including one that is among the most popular of Florida dive sites, King's Spring. The bay's banks are

lined with tall reeds and grasses, while its bed is almost completely choked with leafy freshwater plants. In its center, several islands are sanctuaries for birds and small animals. Signs warn boaters that manatees may be present and caution them to be aware of their presence.

Crystal River has obviously adopted the animal. Businesses commonly use the manatee name and likeness as parts of their trademarks. This is a tourist city, one that has managed to remain very home-townish—a place you feel you should have grown up in and perhaps ought to return to, permanently. The inherent, quiet delicacy of Crystal River's grassy waterways, combined with its large winter population of manatees, are among the city's biggest attractions.

In its springs, the stage is prepared for one of the most intriguing natural relationships a diver can experience—one that places a very high degree of responsibility on those who choose to participate.



Spearpoints, fossil teeth— Santa Fe River.

Here, a diver can swim with the kindly manatee, so long as the animal chooses to allow it. By law, that is interpreted to mean the manatee must initiate the encounter. Chasing them is legal harassment and can result in a heavy fine. During the season when the majority of animals are near the springs, November through April, there is only one relatively sure way to get a close look at them. Enter the water quietly, wait patiently at a distance and allow the manatee to come to you. Any attempt to swim to them can be considered harassment. State officials recommend divers not attempt to touch the animals, although it is not considered unusual for one to nudge you.

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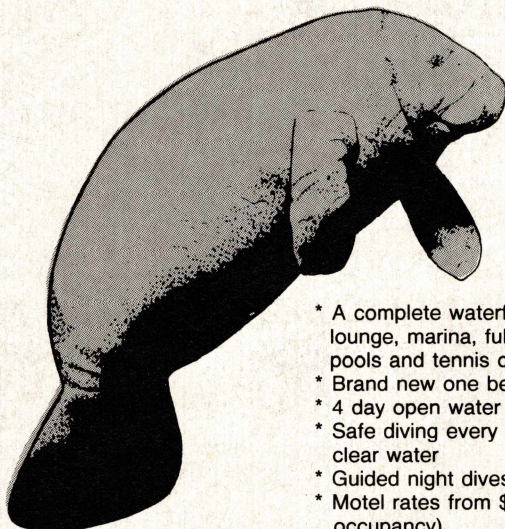


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Florida's Springs

traction in Crystal River. Several springs are diveable, with King being the most popular. It is a relatively large hole with extremely easy access. The area surrounding it is shallow, making it simple to put on gear while standing on a solid rock lip. Once over the edge, schools of freshwater bream and bluegill swarm around, waiting to be handfed. The water temperature, a consistent 72°F year-round, makes a full wetsuit necessary for optimum comfort. Visibility can be well over 100 feet, although normally less when a large number of divers are present.



FLORIDA'S SPRINGS

The crystal clear springs and meandering rivers of central Florida are easily reached and attract hundreds of thousands of divers and other watersports enthusiasts each year.

Getting to King and neighboring springs is quick. Four of the five dive operators, Crystal Lodge Dive Center, Palmetto Scuba, Plantation Inn Marina and Sand Dollar Divers, are affiliated with large hotels on the river. Each rents flat bottom, drive-it-yourself, johnboats with small outboards. Most also offer group tours to the springs and river. Individually guided tours are available through Sand Dollar and Talley's Pro Dive.

All but Sand Dollar and Talley's are almost in front of King's Spring. Talley's is

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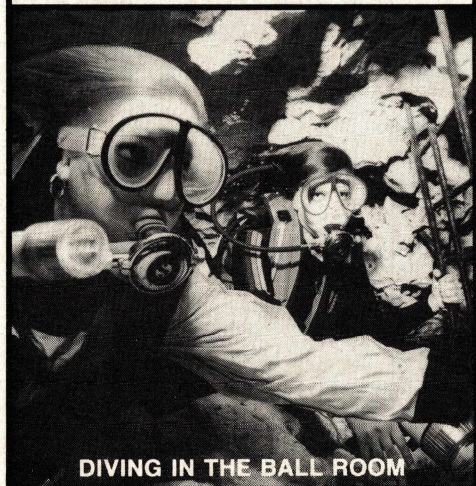
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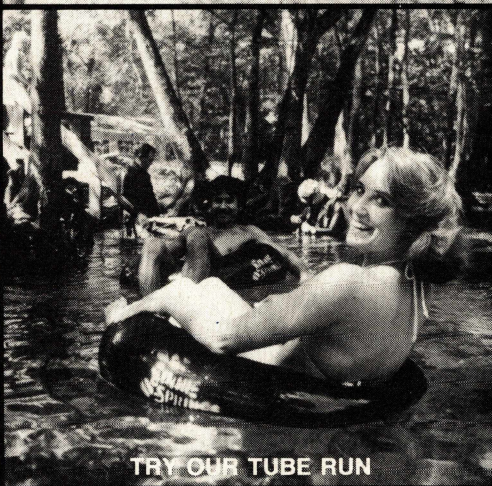
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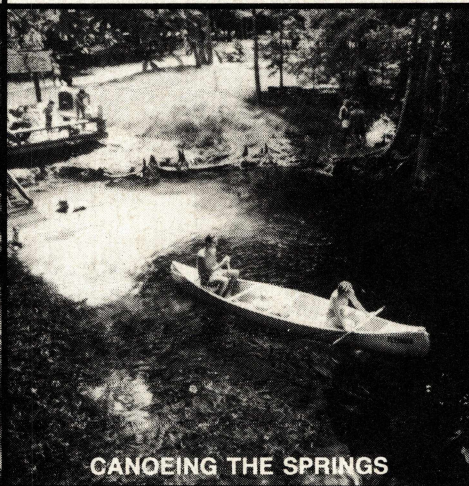
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Florida's Springs

in a shopping center on US 19, while Sand Dollar is several miles north at the Holiday Inn. The trip to the main spring from the Holiday Inn is via a meandering river cruise through a natural strand of Florida wetland. Lily pads float on the surface while native birds soar overhead. Forty minutes away, the Rainbow River literally percolates its way out of the sand near Dunnellon. Thousands of tiny spring outlets open in the river bottom and the sand seems to boil. The lateral view has been measured as high as 300 feet, possibly the clearest surface water in the United States.

Unfortunately, no dive facilities are at the river, a boat is required to get to the head spring. Luckily, Crystal River dive operators charter day trips. Although shallow, with a maximum depth of 16 feet, the Rainbow River is a "must see" area for any Florida dive vacationer.

If getting out in the woods is on your priority list, there is a dive resort that is also a popular camping area. Ginnie Springs Resort and Dive Center, northwest of Gainesville near High Springs, is spread along the banks of the Santa Fe River. Three springs in the private park are among the most popular in Florida: Ginnie, Devil's Eye and Devil's Ear.

With complete camp facilities, the heavily wooded, secluded nature park operates a well equipped retail/rental dive operation just a few hundred yards from Ginnie. In addition to diving, camper/divers can drift down the river on an inner tube or paddle a canoe up it to one of the smaller springs. A general store makes it possible to stay out in the woods for a week or more without having to leave for provisions. Non-campers can find lodging at modern hotels just a few miles away, near one of the state's main north/south arteries, Interstate 75.

All of the major springs have wooden decks and stairways

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HIGH SPRINGS

Ginnie Springs

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leading into the water. Ginnie, at the end of a long, turning slough, opens directly into the Santa Fe. On the bottom, powder fine sand reflects the sun's light making water clarity even more evident.

Bass, bluegill and bream dart about the spring, while small turtles hide in the grasses along the edge. In the center, two narrow openings lead into a wide cavern at the mouth of an underground river. Water rushes out, constantly recleansing the slough. Inside, a guide rope leads down to the permanently grated cave entrance. It is forever sealed and there is no chance of becoming trapped inside, yet divers are still cautioned to follow the basic safety rules of cavern diving. Do not enter with less than 2,000 psi in a tank; exit with two-thirds of your air remaining; stay in the natural light zone.

At nearby Devil's Eye and Devil's Ear, the scene is similar, yet very different. The caverns at these springs are not grated. Millions of gallons of ultra-purified water gush upward instead of laterally as at Ginnie. Their fast flows make it somewhat difficult to enter. Enormous logs lie across their mouths, providing excellent photo backdrops. Inside the circular opening of Devil's Eye, the water has worn away the white limestone leaving several short, vertical columns.

Devil's Ear lies almost directly below the dark waters of the Santa Fe River. The perpetual coloration of cypress trees leaching their tannic acid into the river reflects at daybreak to create an amber glow on everything around. Beneath the coffee colored overlayer, the spring is clear. At 40 feet it narrows to become a raging fire hydrant. Divers not specifically certified in cavern techniques must not pass this point. Beyond, the natural sunlight cannot be seen and the spring turns into an underground maze: One that has claimed more than one life.

Out in the river, the dark amber water hides the remains of prehistoric relics. Camel's teeth, python's vertebrae, mastodon molars and other archaeological treasures are unearthed by simply fanning away the sand. Recent finds have included large shark's teeth, Indian tools and spearpoints. Visibility in the river is limited and the current is swift, but with good technique and perseverance excellent artifacts can be recovered.

A half hour further west, the Ichetucknee River, flowing through the Ichetucknee Springs State Park, provides one of the most unique experiences in upper central Florida. Entering near the spring's head, river running divers glide several miles along the bottom in depths averaging 10 to 12 feet. No effort is required, simply use your fins as rudders while allowing the current to propel you through the clear water. On weekends, thousands of inner tube drifters float by. Trams meet them at the end of the drift to carry them back to the beginning. The scenery is all Florida wilderness: clean and natural.

Just a few miles from the Ichetucknee, across fields of peanuts and tobacco, is the small town of Branford. "Way down upon the" banks of the south's most celebrated waterway, the Suwannee River, it is hardly large enough to be termed a city. It is also an unlikely place to find a large retail dive store, but it is home to just that: one of the busiest in central Florida, the Branford Dive Center. Divers are in the majority as tourists and the city government is actively engaged in inviting them to town.

In the midst of some of the finest spring diving in the state, Branford provides a complete service center for the thousands that drive to this area annually to dive the dozen or more springs open to the public. Some of them, like Troy, are wide, clear and deep. With 80 foot maximum depths, it is one of the most popular for large groups. The skeleton of a scuttled Civil War steamboat, the *Madison* (SDM, Sept. '84), sits in its run just as it enters the Suwannee.

Next to the dive store, the Branford Spring is fun for swimming and gear checks. Sixty feet across and 20 feet deep, it has wooden decks with ladders on two sides. Not always as clear as some other springs owing to its river proximity, it is still a pleasant dive.

Popular Branford springs include the Little River, a limestone

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Florida's Springs

DIVE THE WORLD *skindiver*

basin with a sandy bottom reaching 15 feet before becoming a cave system. The area is safe outside, but inside is not recommended for divers not certified in cavern techniques.

Royal Spring has a very large basin, more than 120 feet across. With steep banks, it reaches depths of 35 feet and is a popular check-out site. A cave system opens to one end and should be avoided.

The Spring Quarries, several abandoned stone beds, provide clear, open areas. Up to 120 yards across, the water reaches depths of 35 feet. Visibility usually stays around 50 feet, but may be less depending on the season. The hole is alive with catfish and lush greenery.

Another picturesque site is Yana, or Blue Springs, of Lafayette County. Several sink holes, underground caves whose roofs have collapsed allowing the land above to sink and become flooded, start on a high bluff near the river. Free divers can easily swim under a stone bridge in its slough. Again, caves in the area are

restricted and should be avoided.

Crystal River and the rest of Florida's spring territory is easily reached by highway from any part of the country. Regardless of where out-of-state divers may plan to drive on the Florida peninsula, the springs are not likely to be far off the route. With consistently clear visibilities, no waves and constant water temperatures, these are some of the biggest dive bargains in North America. »

HELP SAVE THE MANATEE

The West Indian manatee can weigh over 1,000 pounds and reach a length of ten feet. It has only one natural enemy, man. In one recent year, 11 percent of Florida's manatees were killed by careless, speeding boaters. Although their skin is thick, a boat prop can easily maim or kill a manatee. The State of Florida recommends the following steps to help save this endangered mammal:

1) If you are a boater, slow down in areas known to be inhabited by manatees. These areas have signs posted to warn you of their presence.

2) If you plan to dive with them, look, but do not touch! Take all the pictures you want, but only if the manatee comes to you. Don't chase them!

3) If you fish, do not discard tangled monofilament line. Manatees are easily injured by fish hooks and line hidden in the plants they eat.

Information about the manatee is available from:

Save the Manatee Club
Florida Audubon Society
1101 Audubon Way
Maitland, FL 32751

Report injured animals or information about their abuse to one of the following:

U.S. Fish and Wildlife Service
Division of Law Enforcement
(904) 386-8079
(305) 526-2916

Florida Department of Natural Resources
Division of Law Enforcement
(904) 488-6559

Florida Marine Patrol
Manatee Information Center
(800) 342-1821 (toll free)

ADDITIONAL INFORMATION

For information about the Florida springs dive area, contact:

Ms. Donna Jay
Chamber of Commerce
Citrus County Suncoast
117 Northwest Highway 19
Crystal River, FL 32629
(904) 795-3149
or
Mayor Gene Broome
City of Branford
Branford, FL 32008

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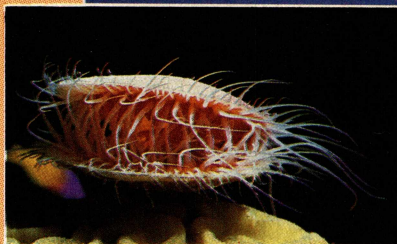
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CLASSROOM OF CORAL

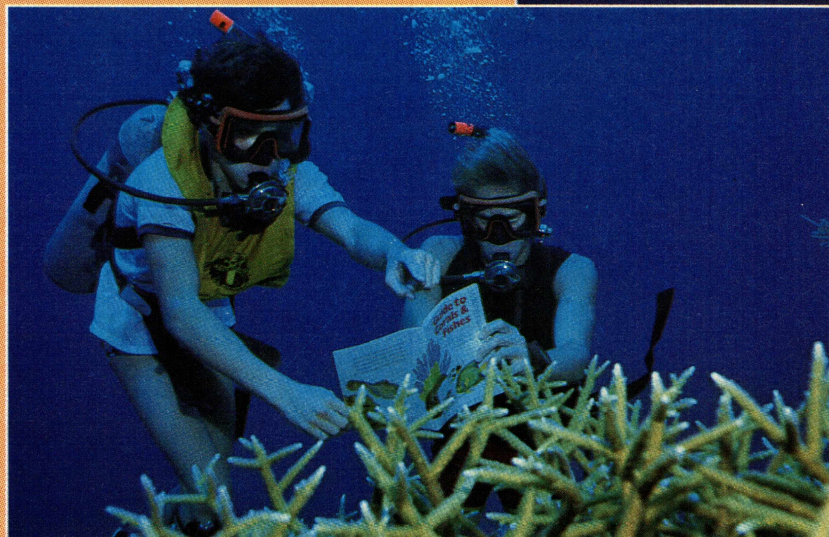
See & Sea/Florida International
University Conduct Marine Life
I.D. Courses on Coral Reefs

BY JEFFRY H. MARCUS, PH.D.

photo/Carl Roessler



photos/Paul Humann



Coral reef biology courses are designed to help divers identify reef species and to aid in their understanding of them. Above: A lovely flame scallop and a diver's arm being "cleaned" by tiny fishes. Left: A *Waterproof Guide to Corals and Fishes* takes lessons U/W.

Most scuba divers are attracted to the sport because of the unique opportunity it gives them to explore areas alive with a multitude and diversity of living color and form not seen elsewhere on earth. Often divers emerge from the reef ecstatic about discovering a strange and exotic creature—but they haven't the slightest

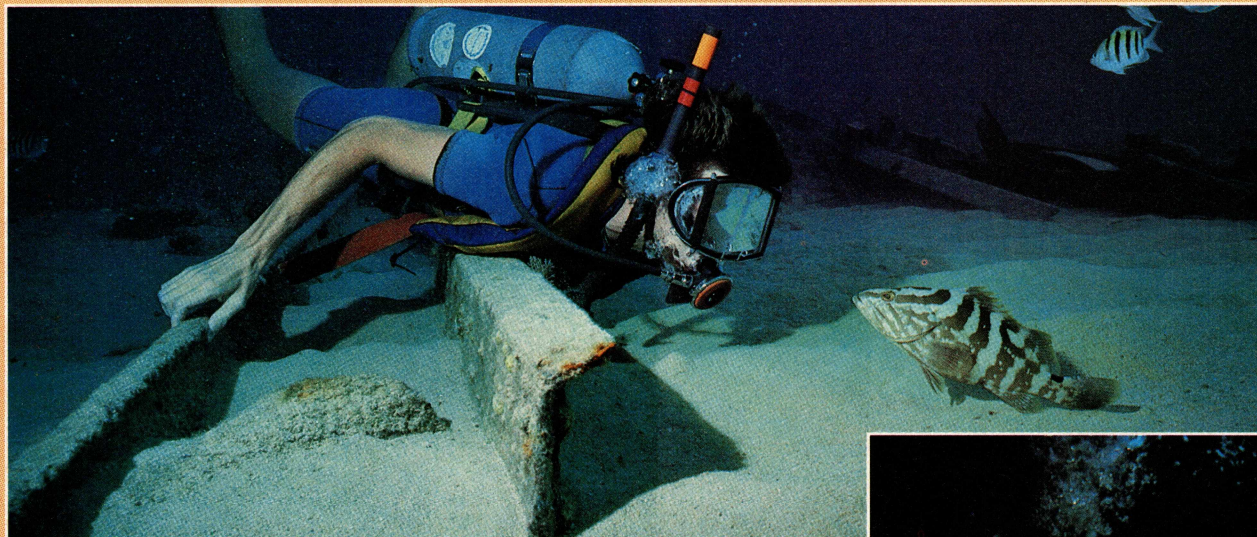
idea what they have seen. I have heard a sea cucumber described as a brown blob sticking from a rock and a tube dwelling polychaete worm called a large coral polyp.

In an attempt to reverse this trend See & Sea Travel, in conjunction with Florida International University, Miami, has organized a coral reef biology

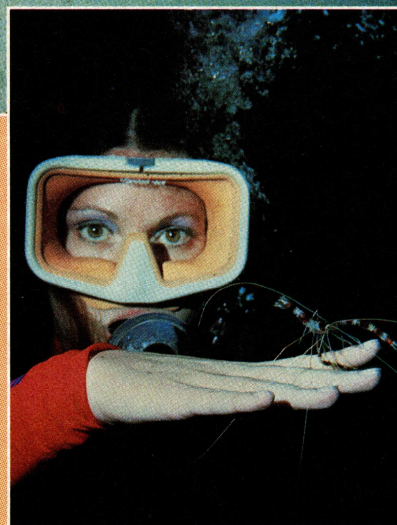
course. Designed to help the diver identify the major reef species, the course also aids in understanding how this diverse community interacts to create a beautiful and balanced underwater ecosystem.

The course is taught by Dr. Walter Goldberg and me. We are both faculty members of the biology department at FIU with experience in research and teaching related to coral reef communities, with special emphasis on Caribbean species. University credit is available for those interested but this

travel



Above: Diver and Nassau grouper identify each other while sergeant majors take in the scene. **Far right:** Diver and banded coral shrimp get acquainted. **Right:** A crinoid undergoes scrutiny.



photo/Carl Roessler

is not mandatory.

Class convenes on well equipped dive boats for seven days. Currently the course is offered on the *Cayman Diver II* (Grand Cayman Island) and the *Isla Mia* (Lighthouse Reef - Belize).

During the day the diver is free to explore the reefs at leisure. Questions on identification are answered either on the reef (with an underwater slate) or on the boat. Casual discussions are almost continuous, based on the diver's interests and observations. A microscope is available for more precise topside observation.

Lectures are held in the evening after dinner accompanied by underwater slides, many of which are from the excellent collection of photographer Paul Humann. Topics such as coral reef formation and identification of reef organisms ranging from the simplest invertebrates (sponges) to the complex vertebrates (fish) are covered. Community interaction is discussed: for example, predator-prey and symbiotic relationships. Dangerous and

venomous organisms are also a featured slide presentation.

The coral reef provides an inspirational classroom where learning becomes easy and enjoyable. Enthusiastic divers seem well supplied with questions and sometimes have requests which necessitate prompt adaptation. On one trip to Belize a request was made to examine plankton in surface water. We did not have a plankton net aboard yet improvised using the panty hose of an eager diver. Admittedly unorthodox, the panty hose plankton net did manage to capture one crab larva which stimulated great conversation on the life cycle of crustaceans. From now on a proper

net will be available.

This is a unique opportunity for divers to gain a greater understanding of the reefs on which they dive. Thus far, the program has proven very successful. Divers who have already taken the course have commented enthusiastically that the information provided has greatly expanded their appreciation of the reef community. Knowing the reef's inhabitants and how they interact with one another has opened a new dimension to their diving.

Courses are currently being held four times yearly. Information can be obtained from See & Sea Travel, 680 Beach Street, San Francisco, California 94109.

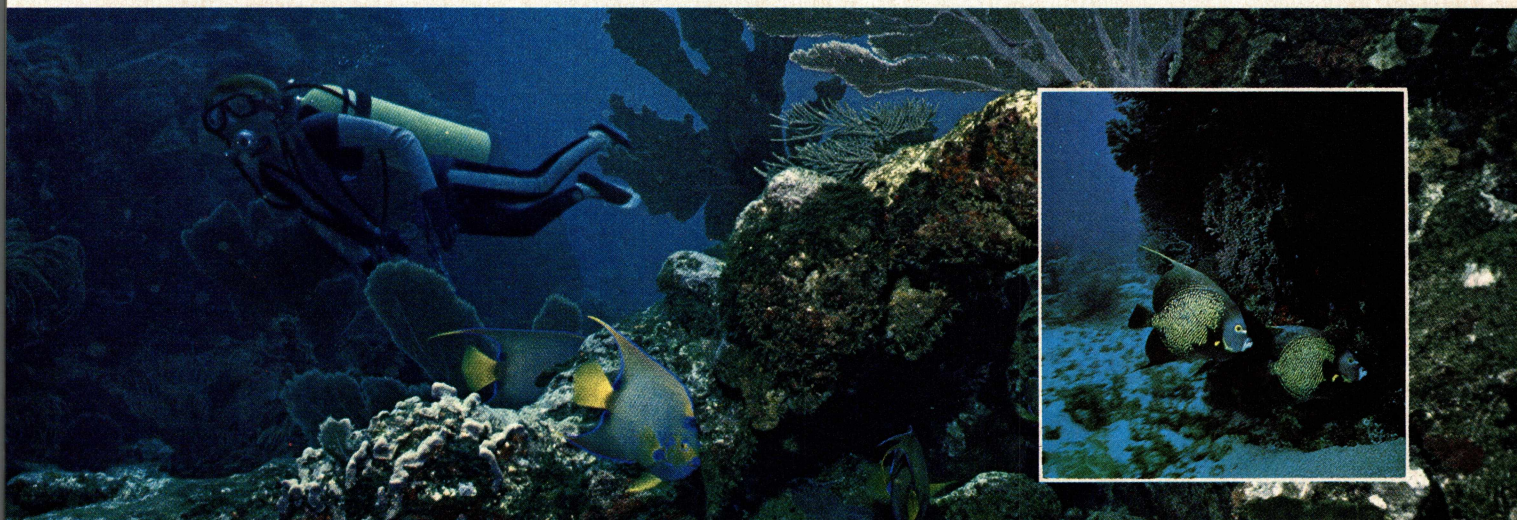
GOING ON A DIVE TRIP?

Are you planning a dive trip to another state or a spot outside your local area? Check the **DIVERS DIRECTORY** in the back of this magazine for information on:

- AIR STATIONS
 - TANK RENTALS
 - BOAT TRIPS
 - REPAIRS
- and other services.

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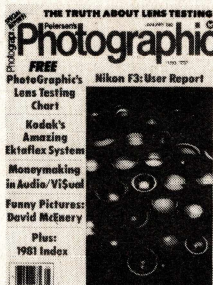
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DESTINATION HAWAII

Destination Hawaii, an association of 26 dive/snorkel businesses across the state and two equipment manufacturer/distributors, is promoting Hawaii as a major diving and snorkeling destination.

The Hawaii dive/snorkel businesses have set competition aside in order to coordinate their efforts toward promoting the excellent dive opportunities throughout the state.

In addition to its promotional purpose, Destination Hawaii is a means by which to maintain the quality of service and safe diving practices throughout Hawaii.

For more information contact Destination Hawaii, P.O. Box 90295, Honolulu, HI 96835.

CAYMAN MOORINGS

The Cayman Islands diving community is continuing to preserve its beautiful reefs by installing a network of orange buoys. These will mark permanent moorings and allow boats to visit popular dive sites without dropping anchors that damage the reefs.

The moorings were installed by the Cayman Islands Watersports Operators Association (CIWOA). Moorings have been in place for three years on some sites, but the association has begun to expand the system.

Through a joint effort between CIWOA and the Department of Tourism, matching funds of over \$4,000 have been allocated to place moorings on all popular dive sites in the West Bay area, South Sound and the northwest coast.

ALM/BONAIRE NONSTOP

ALM is offering nonstop service from Miami to Bonaire. The new flight departs Miami each Sunday at 5:15 pm.

Previously, the only nonstop service to Bonaire from the U.S. was via ALM's flight #972 every Saturday. Daily service is available via ALM through Aruba and/or Curacao with a 2:00 pm daily departure from Miami.

DEEP WATER CAY CLUB

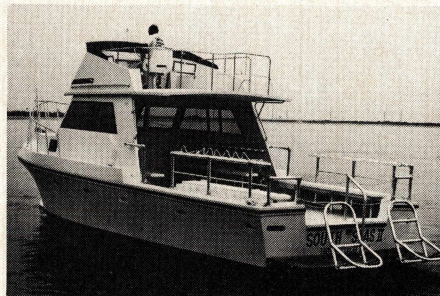
Mary and John Brooks have recently joined Deep Water Cay Club at East End, Grand Bahama Island as the new on-site managers. Formerly with UNEXSO in Freeport, the Brooks taught a number of specialty diving courses which will now be offered at Deep Water Cay.

For more than 25 years, East End's fishing has overshadowed its diving. Now, equipped with a 27 foot dive boat (*Magic*), a 15 cfm Worthington and a back-up 5 cfm Bauer compressor, DWCC is ready to offer personalized dive vacations to individuals and groups.

For information contact Cindy Wilkie at (305) 684-3958 or write: Deep Water Cay Club, P.O. Box 1145, Palm Beach, Florida 33480.

SOUTH SEAS AQUATICS

South Seas Aquatics, Honolulu, Hawaii, has a new 38 foot custom dive boat designed and built by Delta Boat Works. The *South Seas II* features tank racks de-



signed to accommodate 42 scuba cylinders, an outside freshwater shower, a head and a 12 foot dive step with two boarding ladders.

With the addition of this 38 foot boat, South Seas Aquatics has the capability of putting 60 divers a day into the water, with no more than 16 per boat.

The *South Seas I* will be moved to the south shore of Oahu where it will be used to dive sites such as Fantasy Reef, 100 Foot Hole, Ewa Pinnacles and others. >

VI VIDEO

Hidden Treasures of the Virgin Islands is a 23 minute documentary now available to dive shops, clubs, travel agents and individuals interested in learning more about what's available in St. Thomas—both above and underwater.

Produced, written and directed by underwater videoman George Monteiro, president of Sea-Cam, *Hidden Treasures* explores the famous wrecks of the *Cartanser Sr.* and the *Rhone* as well as local dive sites available through the St. Thomas Diving Club. It also shows why St. Thomas is one of the premier tourist destinations with its fine restaurants, duty-free shopping, fabulous beaches, sports activities and tourist attractions.

Hidden Treasures is available for purchase or loan from the St. Thomas Diving Club, P.O. Box 4976, St. Thomas, U.S.V.I. 00801. >

DAN VIDEOTAPE

A videotape describing the Divers Alert Network (DAN) is now available. The tape was filmed at DAN's headquarters, the F.G. Hall Hyperbaric Laboratory. The lab is the largest civilian hyperbaric chamber complex in the United States and was the site of the world's record manned deep dive to 2,250 feet in 1981. The tape describes DAN's hotline, its membership association and depicts current diving research.

The tape is available through Scuba World for \$29.95 and includes an individual \$10 membership in DAN. Please specify Beta or VHS. Contact: DAN Tape, c/o Scuba World, 5509 Airport Freeway, Ft. Worth, TX 76117. >

Cayman Islands

SKIN DIVER magazine calls the Cayman Islands "The Mt. Everest of diving adventure — now the most popular island diving destination in the world." And it makes no difference whether you are an experienced diver, or getting your first check-out in open water.

The drop-offs are awesome. And so is the wall diving. But you can also walk off Seven Mile beach and submerge in a fairyland of coral trees, exotic flowers and teeming marine life, a few yards from shore.

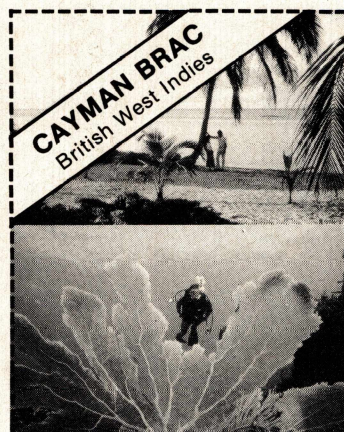
Best of all the dive sites are close-by. Whether you dive Grand Cayman, Cayman Brac or Little Cayman, there are no expensive boat trips or long drives to distant locations. And the islands are only a few minutes apart.

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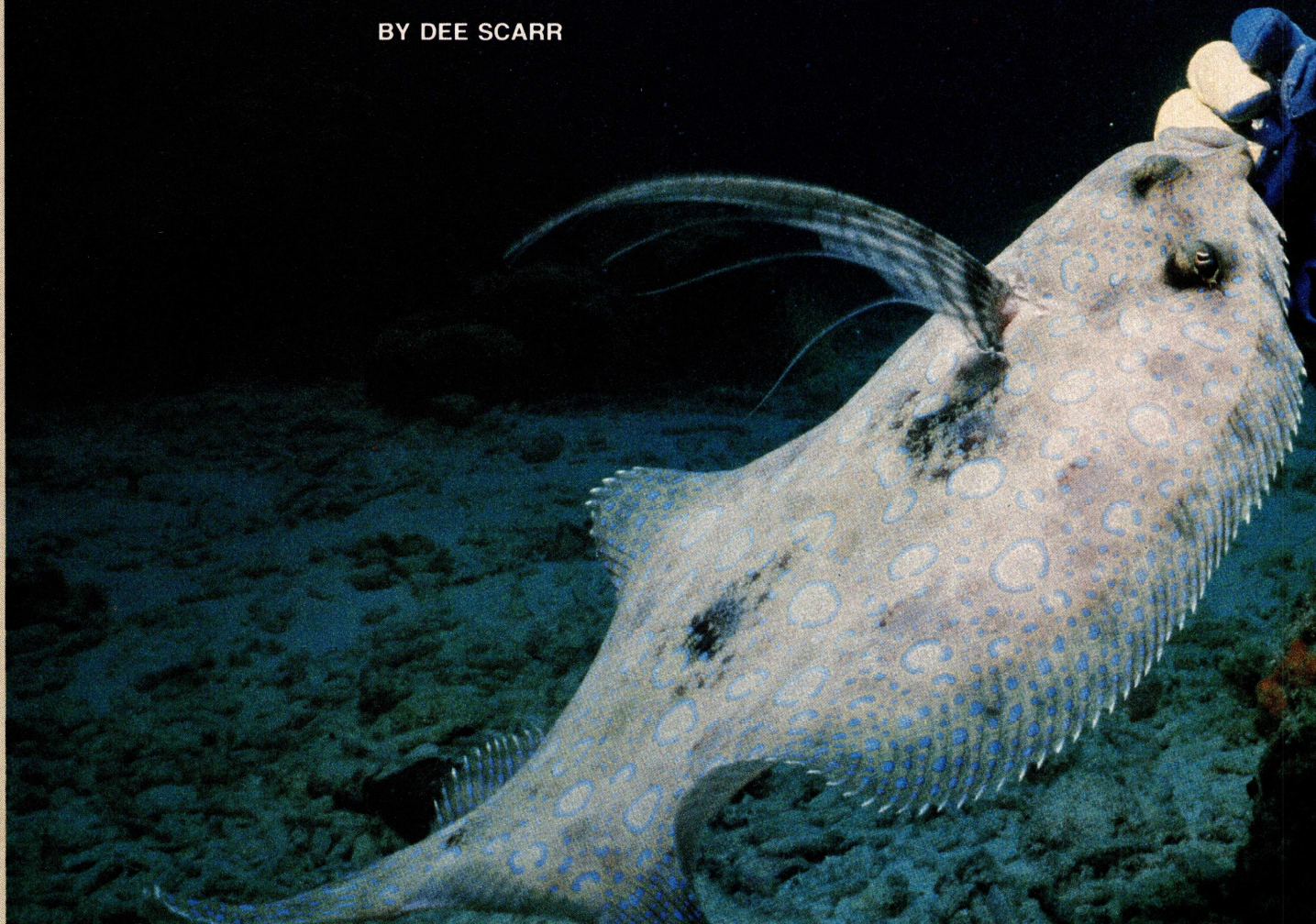
Tiara beach hotel

Mail to: Divi Hotels Executive Office
520 West State Street
Ithaca, New York 14850



Oliver's twist

BY DEE SCARR



Oliver gulped down the fish tail, extended and retracted his mouth, then spit out the fleshless bone. If my buddy hadn't later confirmed what I'd seen with my own eyes, I wouldn't have believed it.

I first saw Oliver in July and since he was large for a peacock flounder—about 18 inches—and facing into the current, I decided to see if he would be interested in a bite to eat. I squeezed a small piece of baitfish so the juice drifted downcurrent to the flounder, who stirred and looked around. I squeezed the fish again and waved it near the flounder's mouth. He lifted his head slightly off the bottom to better smell the fish, then sucked it right out of my fingers and glided away.

The fish was gone and so was Oliver.

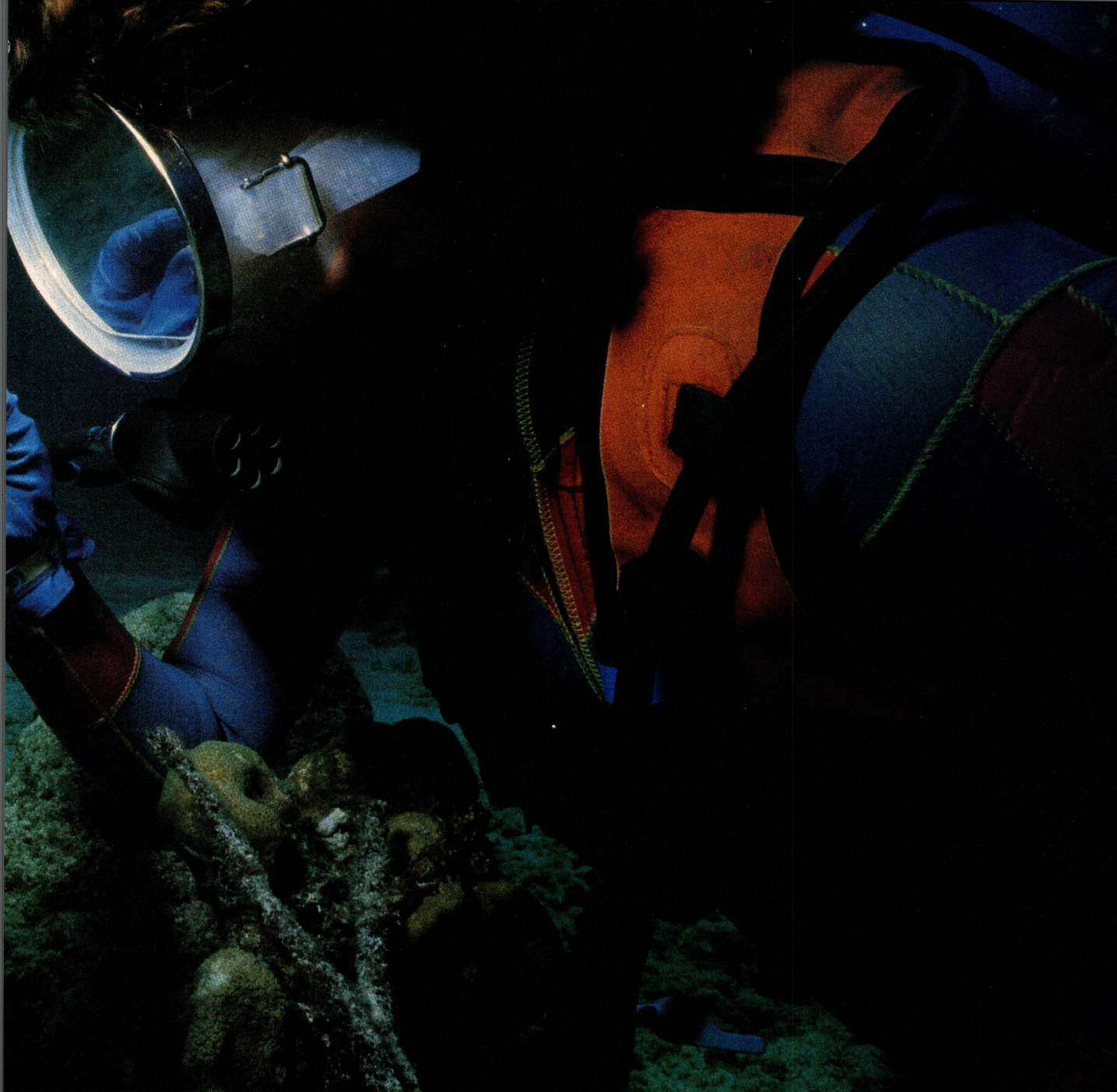
I began to suspect I had just met a unique individual. After all, flounders as a rule don't have a lot of personality. The most interesting thing about them may be their life history: At birth their structure is just like a normal fish. Then, when they're a few days old, each fish's right eye migrates to its left side and the fish settles to the bottom to spend the rest of its life oriented sideways. Peacock flounders are usually skittish around divers, so especially in contrast to other flounder behavior, Oliver's trusting responses to people are exceptional.

After our first meeting I was hoping I'd find Oliver again, and I did—only this time

he was facing into a coral head and the current was flowing away from his head. With his periscope eyes watching me, I waved a piece of fish near his tail (since his head was inaccessible). Immediately he turned around and grabbed my offering: He remembered our previous encounter as well as I did.

On subsequent dives I began to hold the food off the bottom and Oliver would swim up to my offerings. His willingness to leave the security of the bottom, very unflounderlike behavior, is evidence of his trust in me. He almost always refuses food from anyone else.

Once I tried to feed him cheese (enjoyed by yellowtails, angelfish and even



photo/Herb Segars

groupers): He took one piece, swam back to the bottom and spit it out. On that day I needed to save my baitfish for an eel, so when Oliver rejected the cheese my buddy and I gave up on him and swam over to a spotted moray. I offered the tail half of a baitfish to the eel while holding the head in my other hand, ready for the moray's second course—but before the eel even smelled the fish Oliver zipped over my shoulder, snagged the fish head and scooted away with his booty. That was the day he earned his name: Oliver Twist. (From the well known play *Oliver!*: "... Never before has a boy wanted more.")

Oliver's dietary preference is very

clear: he likes fish. Not cheese; not conch; not hot dog. One day I fed him two pieces of fish, then offered him a piece of hot dog. He gobbled it down, swam off and spewed it out. So much for hot dog.

If I feed him a piece of fish that is too big, Oliver will spit it out and suck it back in again, over and over, until either he has worn it down to size or it gets into position to swallow. One day when he swam off with part of my gift hanging from his mouth he was chased by several greedy yellowtail snappers. He showed masterful evasive techniques; fast swimming, unexpected changing of direction, color changing and even burying himself in the sand—all the while shifting the piece of

fish into a better position to swallow it.

My interactions with Oliver don't always involve food. I would like him to become accustomed to being touched and he occasionally lets me stroke him. At first when I put my face close to Oliver's, my exhaust bubbles would disturb him, but he quickly got used to their noise. He's also getting used to photographers with their flashing strobes and is learning that framers are not necessarily to be feared. He frequently will stay with my buddies and me for an entire dive: He knows my diving pattern so well that he has begun to swim ahead of us instead of following. I don't seek Oliver on the reef anymore—he finds me. >

FREEPORT'S



John Englander

Twenty years is a long time in a sport as young as scuba diving. Yet, for 20 years the Underwater Explorers Society (UNEXSO) in Freeport, Grand Bahama has flourished as one of the Caribbean's most popular dive destinations. In its present form UNEXSO offers a superior scuba instruction program, a large and modern retail facility and daily boat excursions to the best diving in Freeport. To appreciate the UNEXSO of today, it is interesting to look at the UNEXSO of 1965.

In the early 1960s the sport of scuba diving was just beginning to gain public acceptance and a group of investors had

the dream of creating the world's foremost diving hotel complex. Freeport was chosen as the site because of the close proximity and ease of transportation from the United States and because of the quality of the diving. Al Tillman was hired as the first president based on his success in establishing the Los Angeles County scuba program. He in turn hired an extremely talented staff, including Jack McKenney, Dave Woodward, Chuck Peterson and Bob Farrelly. The physical aspect of the Underwater Explorers Society was equally impressive with a magnificent 18 foot deep training tank, classroom and darkroom facilities, boats and accommodations all in a protected harbor with easy ocean access.

At the outset the Underwater Explorers Society was conceived as a private club with a rather elite membership. The Freeport branch was to be the first of several such operations around the world. While this concept proved untenable given the state of the dive industry in the late 1960s, their instruction programs and ITCs were the magnet that brought John Englander to the Bahamas fresh out of college. After several years of involvement with UNEXSO, John became president of it in 1974 and has been responsi-

ble for major improvements in direction and facilities ever since.

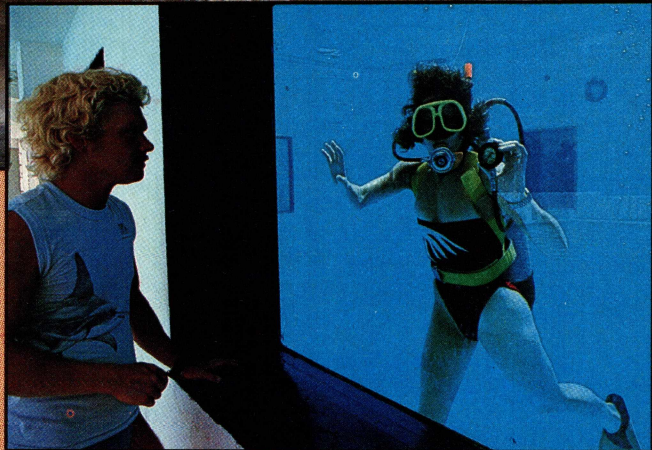
No longer is UNEXSO structured as a private club, but rather actively invites public participation. There is still a club theme in that members receive special diving rates, a quarterly newsletter, discounts on dive equipment and retail goods and recognition via a brass plaque on the wall. However, membership is very reasonable, only \$60 the first year with a \$20 annual renewal fee and it is certainly not necessary to be a member to dive with UNEXSO.

There are a number of quite impressive aspects to the Underwater Explorers Society today. One of the most apparent is a beautiful retail facility featuring a large selection of T-shirts, postcards and prints, island fashions and sportswear, underwater photo gear and diving equipment. Adjacent to the retail area is a small museum featuring artifacts and personalities from the early years at UNEXSO: It is very interesting. Upstairs is the Tide's Inn restaurant and lounge, a great place for a continental breakfast or a hearty lunch and an even better place for an *après* dive drink or two.

The dive instruction program at UNEXSO is among the most complete in the

TEXT AND PHOTOGRAPHY BY STEPHEN FRINK

UNEXSO

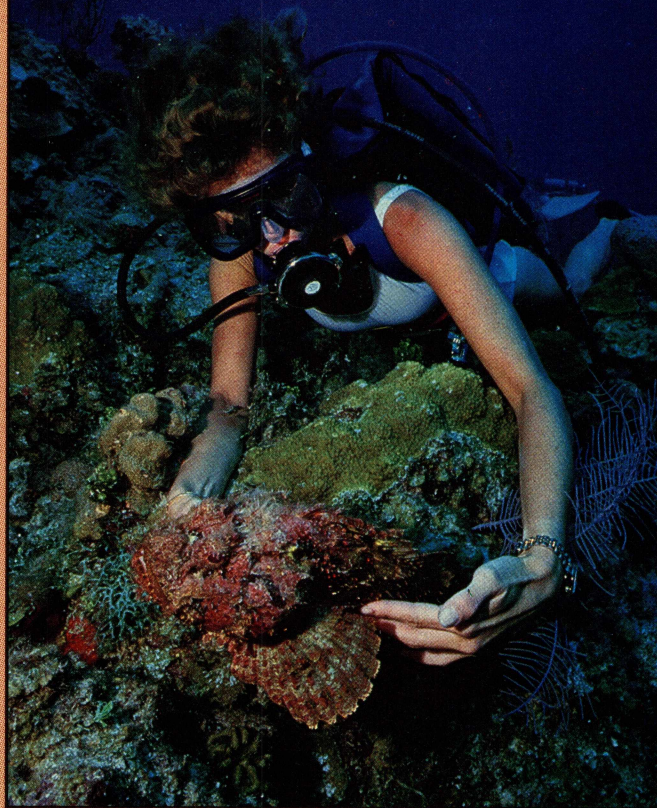


Top: UNEXSO front entrance. Above: Training tank.

Linda Taylor parasailing. Freeport is full of activities to fill non-diving hours including: shopping, gambling, cabaret shows, golf, tennis, horseback riding and just plain beachcombing.



20 YEARS OLD AND IMPROVING WITH AGE



Diver and scorpionfish, Freeport.



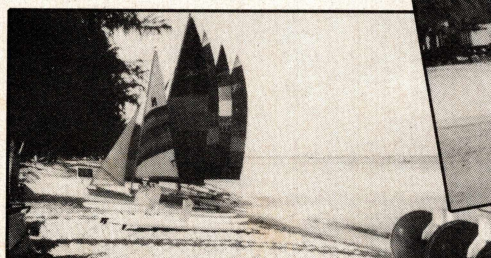
Loading UNEXSO dive boat.

Princess Casino, Freeport.



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UNEXSO

Caribbean and certainly features some of the finest facilities. The 18 foot training tank is used daily for resort courses and scuba instruction. With its substantial deck space and viewing windows it is both safe and convenient. Each year more than 175 divers receive their open water scuba certifications through UNEXSO and over 2,500 enjoy their NAUI Entry Scuba Experience (resort course). In addition, there are advanced courses such as marine life identification, cave diving, underwater photography and decompression diving. As an adjunct to the photographic program, UNEXSO offers automated E-6 film processing. Participants in the five day decompression diving course also learn to use UNEXSO's recompression chamber, the only one in the Bahamas.

There is ample classroom space to accommodate the various instructional programs and the teaching staff is extremely qualified and motivated. There are on-premises boat docks with gear rental nearby as well as twin 22 cfm Ingersoll-Rand air compressors. The fleet of dive boats includes the *Explorer One*, a new 40 foot V-hull vessel that can accommodate 24 divers and cruises at 18 knots; the *Biene*, a 42 foot Thomas V-hull for 18 divers and the *Rio Rita*, a 27 foot dive boat for up to 12 divers. All the boats feature tank racks, full dive platforms and Caterpillar diesels.

The average day of diving at UNEXSO will include an 8:30 am departure for the deep reef (60 to 80 feet) or to Theo's Wreck in 110 feet. At 10:30 the boats take off for the shallow reefs (10-20 feet) and at 1:30 the trips to the medium reefs (30-60 feet) are scheduled. Of course, night dives are encouraged and cavern dives may be scheduled as well.

Dependability is one of the key principles contributing to the success of UNEXSO today. The boats will always run on time, the scuba equipment and compressors will be in good repair and on the first Monday of every month a new certification class will begin. Of course, classes may start at any time with four or more students, but vacationers wishing to get certified are able to count on a class beginning the first Monday of the month, even if there is only one student.

UNEXSO does not offer lodging on their premises anymore, but does feature dive/lodging packages with most of the better hotels and condominiums in Freeport. For example, during our recent visit we stayed at the Holiday Inn just a few blocks from UNEXSO. There are lockers with padlocks at the club for dive gear, but we chose to carry our U/W cameras back to the hotel each night. The hotel is



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on a sand beach and features numerous recreational amenities.

Freeport is full of activities for the non-diving hours with excellent duty free shopping, casino gambling and lavish cabaret shows. I recommend the Soiree show at the Princess Casino—it has exciting choreography. Golf, tennis, parasailing, horseback riding and beachcombing are also available.

There have been substantial changes at the Underwater Explorers Society over the past 20 years and UNEXSO will undoubtedly continue to grow and improve in the future. Progressive management in combination with excellent natural resources above and below the water in Freeport suggest optimism for UNEXSO and confidence for the diving public. For further information or reservations, please contact UNEXSO at Box F2433, Freeport, Grand Bahama or phone (809) 373-1244. 

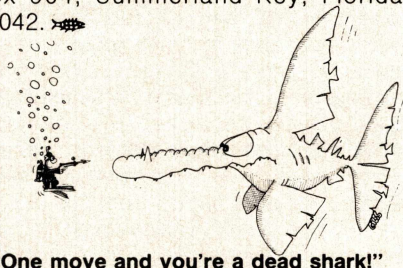
SHIPWRECK RESEARCH POSITIONS

The large artifact assemblages from the 1622 wreck sites of the Spanish galleons *Nuestra Senora de Atocha* and *Santa Margarita* are being prepared for a major publication. This study, co-authored by Dr. Eugene Lyon and R. Duncan Mathewson III, will be a synthesis of the archival and archaeological evidence obtained since Treasure Salvors, Inc., first began to conduct research on these sites in 1970.

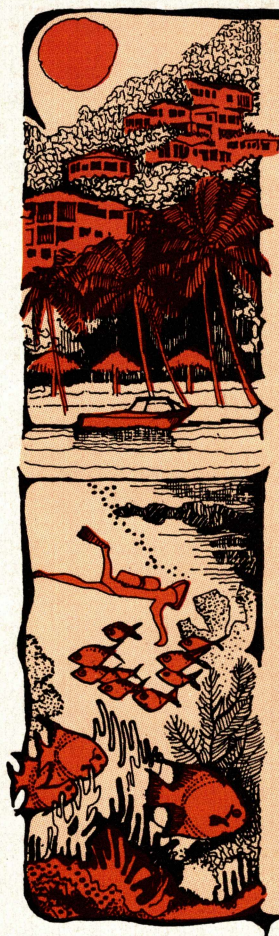
Archival and archaeological research is also being carried out in conjunction with Cobb Coin Company, Inc. on the remains of the 1715 Spanish treasure fleet and other sunken ships off the east coast of Florida.

Graduate students in history and anthropology wishing to assist in these shipwreck projects may apply for two, one-year student research positions with Treasure Salvors, Inc., starting February 1. Salaries will be commensurate with experience. People are being sought with a good academic background and an interest in carrying out their own research in the following areas: artifact conservation, late Renaissance jewelry, historic ceramic typology and shipboard weaponry.

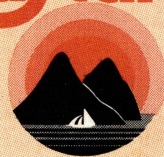
All successful applicants must be experienced divers and show proof of good writing skills. Anyone interested in these research positions should send a resume and two letters of reference by January 15 to: R. Duncan Mathewson III, Route 4, Box 904, Summerland Key, Florida 33042. 



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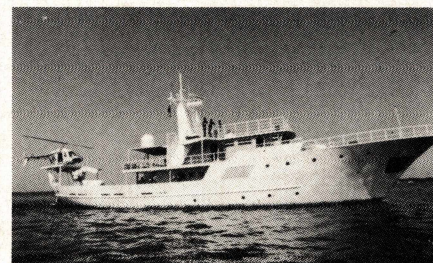
In the Cayman Falls shopping plaza, Grand Cayman Island, Don Foster's Ocean Photo Centre offers Nikonos V cameras, Ikelite strobes, E-6 film processing, camera rental and underwater photography instruction. Myk Garn, a graduate of Brooks Institute of Photography's Undersea Photo Technology Program, will oversee operations at the photo center. He will teach one day courses in introductory, macro and wide angle photography. Combined, the three courses result in certification as an underwater photographer. One week instructor courses are also offered.

The classroom and all photo center services are available to visiting photo instructors and their classes. ➤

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wide communication, video lab and many other extras including a helipad.

See & Sea's *Okeanos* programs will be directed by ship manager Armando Jenick, who has 15 years of diving experience in the Virgin Islands.

Okeanos will range the entire chain of the Virgin Islands, hitting major sites such as the *Rhone*, the Normans and others. She also has the speed to cover Anegada Reef during one week trips. ➤

CATALINA UNDERWATER CONNECTIONS

Oceans Unlimited has formed Catalina Underwater Connections to expand its custom dive tour service to Catalina Island, CA. CUC features tours arranged to meet the needs of small groups of students or recreational divers. Open water instruction is available from Connections staff, or from the lecture/pool instructor who can accompany the tour. Recreational divers make dives fitting their specifications. Tours depart from Dana Point or Newport Beach with overnight lodging provided in Avalon. ➤

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JACOBY U/W PHOTO INSTITUTE

The Jacoby Underwater Photo Institute will be offering 20 photo courses and four photo trips in 1985. Eight separate programs will be offered: disc photography;



Dick Jacoby discusses a photo gear bag.

weekend photo course for beginners and intermediates; five day Florida Keys photo courses (also for beginners and intermediates); underwater video; advanced photography; advanced photography/photo instructor; photo instructor for commercial divers; photo/video vacations.

All underwater photo equipment is supplied for disc, basic and intermediate courses and most photo trips. For trip dates and locations contact Dick Jacoby at The Creative Whale in Chicago.

DIVE AWAY/ISLES OF SCILLY

Dive Away, Inc. of Plainfield, NJ will offer a trip in the summer of 1985 to explore the sunken shipwrecks around the Isles of Scilly, off the coast of Southern England. Some of the ships to be explored are the H.M.S. *Association* and H.M.S. *Eagle*, both wrecked in 1707, and the *Hollandia*, wrecked in 1743.

MCDERMOTT PHOTO COURSE

Shawn McDermott, former resident photo pro with SunDivers Jamaica, is offering a class in underwater photography in the Palm Beach, Florida area. The course will give students a chance to make four open water dives on the reefs and wrecks off Florida's east coast, using the Subsea strobe and Nikonos V camera systems. Students will earn a PADI specialty certification in U/W photography.

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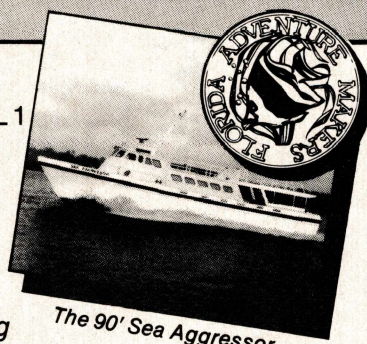
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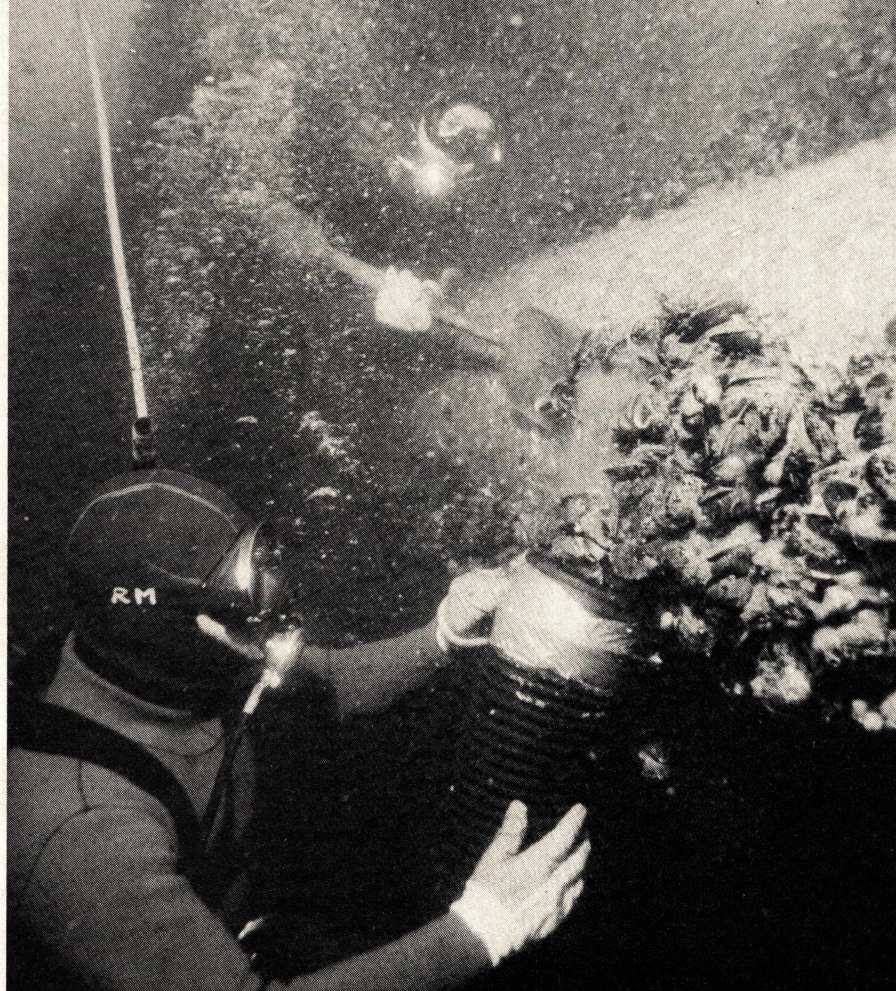
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MUSSELS from the Offshore

BY HILLARY HAUSER



photo/Louis Prezelin

Beneath the steely gray legs of an offshore oil platform in the Santa Barbara Channel, two divers descend beneath the sea—with no design of doing any work related to petroleum. They are a new breed of sea farmer, harvesters of mussels that grow on the gigantic structures offshore—reefs of steel, where many different forms of sealife settle.

One of the divers is Bob Meek, 39, the president of Ecomar Marine Consulting, Santa Barbara, a company that normally involves itself with high-technology underwater surveys. With him is diver Craig Shacklock, who carries in one hand a low-technology tool: a metal scraper.

However, on the first, topside level of platform Habitat, a small crew prepares what looks like a glorified washing machine. It consists of two chambers, the first with stiff plastic brushes inside, the second a rotating cage. A large plastic hose extends from the machine to the sea below.

Soon after Meek and Shacklock disappear beneath the surface, mussels begin

to pour out of the machine (affectionately called "Auto Schlep" by the harvesters), and the topside crew jumps into action.

With seawater gushing out from the machine like a ruptured fire hydrant, Kirby Smith, wearing yellow rubber pants, raises a large lever to let the first batch of mussels out of the solid chamber of the machine into the rotating cage. The brushes of the first chamber knock off most of the encrusting barnacles, anemones and the strong byssal threads of the mussels themselves.

Down below, Shacklock works on a section of platform leg with the metal scraper, shoving clumps of mussels—barnacles, anemones and all—into the end of the vacuum hose held by Meek.

On harvesting days, the divers work for two hours, from 10:00 am until noon, and then they take a break. Just before the second dive of the day, the harvesters call the Ecomar office ashore, to learn what the final order of mussels is from local restaurants so they can gauge their afternoon harvest. The total take for the

day will average about 20 bushels, or 20 of the net sacks filled.

The whole exercise is a classic case of someone taking another's throwaways and turning them into a viable industry, and because of it, a growing number of restaurants in Santa Barbara and other Southern California cities are serving creative versions of *moules mariniere*.

Oil companies with offshore platforms in the Santa Barbara Channel have long regarded mussels as a nuisance, because when the bivalved creatures grow on platform legs, their combined mass creates a severe drag on the platform when ocean currents gain momentum.

Meek said that seven years ago, his company was conducting an U/W study of offshore platforms from Huntington Beach to Santa Barbara when the idea hit. Most of the mussels being used by local chefs were coming from the East Coast, and oil companies were paying diving contractors as much as \$20,000 per year to clean the mussels off their platforms.

In an underwater procedure that might be described as a hydro-blasting of the animals, the mussels—which take nine months to a year to grow after they have settled out of the plankton currents of the channel—are reduced to not much more than fodder for the fish.

Meek went to several oil companies and offered them the services of his company—for free. Ecomar divers would remove the mussels from their offshore platforms, he said, if they could just have the mussels in return.

Then he went to the local restaurants and asked if they wanted to try the mussels of the platforms. Unlike East Coast mussels, which grow in sandy, near-shore environments, the platform mussels, said Meek, grow in non-sandy, open-ocean waters.

There are those who raise an eyebrow at the thought of eating seafood collected from around anything to do with oil, but the open ocean is almost always a cleaner place to harvest than along a coastal area, said Meek. Platform Habitat is in deep water—320 feet—and the mussels are harvested from beneath the surface, where waters are completely free of any surface-floating materials.

Meek said his mussels are water-quality tested regularly—as much as two times a week—and that the platforms he harvests from have been certified safe by California's Public Health Department.

Meek is happy with the reception of local diners to his product, and he is already looking to the day when he can produce other types of seafood from the offshore platforms—including the California oyster, which was, at one time, harvested from the Santa Barbara Channel.

"We know that mariculture on the platforms can work," Meek said. "It can happen if we just get smart." >>>

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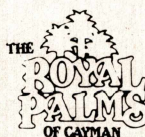


In addition to their highly successful unlimited dive packages with the Royal Palms Hotel, **Don Foster's Dive Grand Cayman** now brings you their Ocean Photo Centre. The Manager, Myk Garn, is an experienced and accomplished photographer and offers undersea photo courses for all divers, with a 1-day course for beginners, a 3-day course for intermediates and a week-long course for advanced photographers. Located in the Cayman Falls. Photo/Dive packages available with 7 Mile Beach accommodations at the Royal Palms.

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RX FOR DIVERS BY FRED BOVE, M.D., PH.D.

Not long ago, I was sitting in a boat as my group prepared to dive the wall at Grand Cayman. I watched some 30 people struggle with many thousands of dollars in equipment; twisting, writhing, grunting, pulling straps, testing regulators, venting their BCs, all for a brief look at the beauty of the deep corals and caves we were all waiting to see. While watching this seething mass of people, nylon and metal, I was struck with the contrast between this cumbersome routine and the advantage of bottom time the equipment provided. Yet, even with our modern gear we cannot match the performance of marine mammals, such as the whale, that can dive to 1,000 feet for an hour or more and return directly to the surface without decompression.

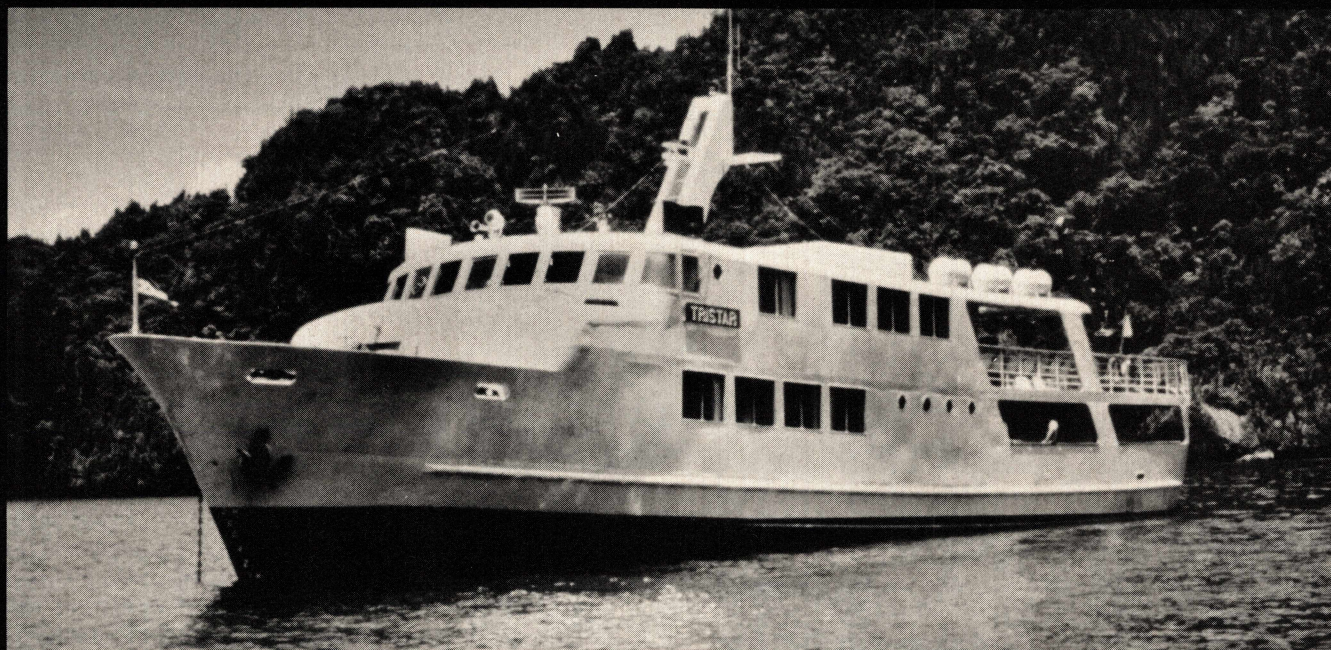
We are, I'm sorry to say, land mammals, poorly adapted to life in the sea. For the foreseeable future, there seems to be little hope for people to match the diving ability of whales, porpoises or seals. These animals and other species have adapted physiologically to survive prolonged underwater exposure. The same physiologic adaptations can be found in people, but only to a minimal degree and one could question whether, by continuous training, we could improve our free diving ability.

In diving animals, two adaptive mechanisms have developed. One is to use less oxygen during the dive; the other, to store more oxygen before the dive. A third factor, the ability of muscles to work with limited oxygen supplies, is already well developed in humans and comes into play with exercise of any kind.

The diving mammals are able to hold large stores of oxygen in their muscles. This is accomplished through high muscle concentrations of an oxygen storing chemical (myoglobin) similar to the hemoglobin in the blood. These stores of oxygen provide a reservoir of internal

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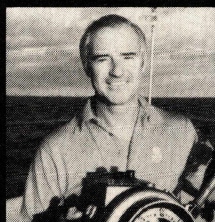
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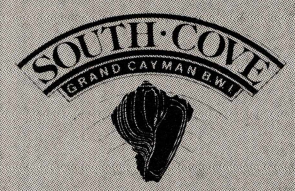


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Rx FOR DIVERS

oxygen which can be used while underwater. The hemoglobin in the blood of diving mammals also seems to release the oxygen more easily, thus allowing the oxygen to be used efficiently.

Reduced oxygen use is accomplished by a unique control system which shuts off blood flow to organs and tissues not needed during the dive, then restores flow after the animal reaches the surface. The stomach, liver, intestines and kidneys can be given a short break while a dive is underway since their functions usually require many hours to complete. Even the muscles have their blood supply reduced during the dive. This might seem to be the wrong response, but the muscles can function without externally supplied oxygen for a short time, so they are also deprived of blood during the dive. Now you should ask—if all these tissues are deprived of blood and oxygen, where does it go? To perform properly, a diving animal must have a normally functioning brain and heart, but oxygen needs for just these two organs are not large. The combination of extra stored oxygen plus redirection of blood from nonvital organs to the brain and heart, gives the animal the needed bottom time.

The reflex controls which shift blood to the brain and heart are only partially understood. They are collectively called the diving reflex. This results in a marked reduction of heart rate and the amount of blood pumped per minute by the heart. In a seal, for example, heart rate can fall from 50 per minute on the surface to 8 per minute underwater. In humans, we find a rudimentary diving reflex that can lower heart rate significantly during diving, but that contributes very little to underwater breath holding time on a free dive. In a study several years ago, we found the heart rate lowering could be increased by physical conditioning and one wonders whether we could adapt ourselves better to breath hold diving by training to improve conditioning and to increase tolerance to breath holding. At present, we can make small improvements in bottom time by conditioning and repeated breath hold diving, but we cannot match the diving mammals who have been in training for millions of years.

HAZARDS IN BREATH HOLD DIVING

Diving without an air supply can produce several unique medical problems that should be avoided.

Shallow water blackout occurs when the free diver hyperventilates to prolong bottom time. The excess breathing does little to increase oxygen stores; its main effect is to lower carbon dioxide in the

blood. Since the urge to breathe come from the combination of high carbon dioxide and low oxygen in the blood, you can develop a low oxygen state (hypoxia) before feeling a strong urge to breathe. If you add a rapid ascent to the surface from even a moderate depth, the sudden decrease in ambient pressure will cause oxygen partial pressure in the blood to fall even farther as you ascend and cause a blackout either at the surface or near the surface. The situation is perfect for a drowning accident. Prevention is by avoiding prolonged hyperventilation before a free dive and not pushing your bottom time to the limits of endurance.

Decompression sickness: Yes, it is possible to get bends while free diving. However, to do so, you must make many frequent deep dives with short surface intervals. Usually, so much effort is involved that most free divers do not accumulate enough exposure to develop bends. There have been several excellent studies of this phenomenon, known as Taravana to the pearl divers of the south Pacific.

Chest squeeze: We know now that chest squeeze is unlikely on a free dive because blood shifts into the blood vessels of the lung to fill up the space left behind by the reduced air volume. Chest squeeze is still possible, but depths of 150 feet or greater would likely be necessary to produce it. Diving mammals are protected from this by a flexible chest which, unlike ours, can compress inward as the air in the lungs is reduced in volume. Since the human rib cage is more rigid and unable to deform as much as the flexible rib cage of marine mammals, chest and lung injury would occur in humans if they tried to match the free diving feats of whales or seals.

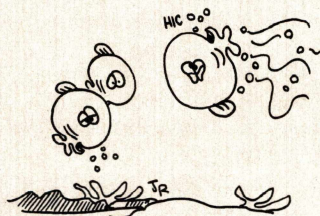
In spite of all the knowledge about free diving, we are still left with severe limitations to its use. So, I will reluctantly continue to don wetsuit, weightbelt, BC, tank and everything else to do what other animals can do with a gulp of air.

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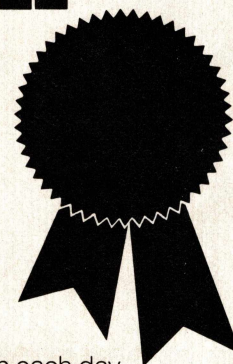
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CHIPOLA RIVER

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TEXT AND PHOTOGRAPHY
BY ALAN WILLIAMS



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There are few activities within the sport of scuba diving that can command the interest of a diver with the intensity and pleasure of artifact diving. True, it takes a dedicated individual, who loves the adventure and challenge of the sport, to venture into murky depths in search of fossils and artifacts. But every second spent underwater is worthwhile when relics from ages past are discovered.

Artifacts are any manmade relics from civilizations past. They can be anything from arrowheads, pottery and coins to old bottles and muskets. Fossils, on the other hand, are the petrified remains of any plant, animal or fish. Objects that fall into this category are shark teeth, mastodon teeth or the bones and tusks from the great woolly mammoth and saber tooth tiger, to name a few.

For years Florida has been known in the archaeological community as a state of tremendous finds, both on land and underwater, for preserved fossils and artifacts. The majority of relics recovered from the rivers of Florida have been discovered by a means called blackwater diving. The term comes from the dark coloration of the water, caused by tannic acid that soaks into the water from the roots of trees and decaying vegetation. Most rivers in Florida fall into this category, with a few exceptions, one being the Chipola River. Known by archaeologists as a high yield area, the Chipola is spring-fed and has a limestone bottom, making U/W visibility excellent.

This little known river winds its way down through the middle portion of the panhandle, as it has through time. The land surrounding the Chipola is rich in history and beauty. From the ancient days of the Indian tribes and Spanish explorers to the Civil War and logging days

of the 19th and 20th centuries, much of the land has remained the same.

The Chipola is formed with two creeks which begin in Alabama and join together just past the Florida state line in Jackson County. Here the river starts its 65 mile trek to the Gulf of Mexico through the slow rolling hills of North Florida, helping to form intricate cave systems throughout the area. In fact, the river helped form the mammoth cave at the Florida Caverns



Arrowheads, camel tooth, shark teeth. Above: Hines Robertson and artifacts.

State Park in Marianna, one of the largest cave systems in the United States. It is within the park boundaries that the river goes underground for about one-quarter mile before surfacing again and continuing its travel south.

Once past the state park, the river runs through the town of Marianna, Florida, where the flavor of the deep South can be felt and seen. Huge oak trees and hanging moss grace the beautiful old houses and mansions throughout the city. Marianna was the site of a big battle which took place during the Civil War. Since the war, many artifacts have turned up in the river around Marianna, to the delight of artifact divers and historians.

One man who has been diving the river since 1969 is Hines Robertson. He lives in Marianna and owns and operates a dive shop in Dothan, Alabama, 30 miles to the north. His excitement about the river has turned many local divers into serious amateur archaeologists.

Hines' display of Indian artifacts and fossils in his dive shop in Dothan tells of many hours spent exploring the waters and spring tributaries of the Chipola River. His findings include everything from an intact dugout canoe, huge mastodon bones, teeth and tusk to a very impres-



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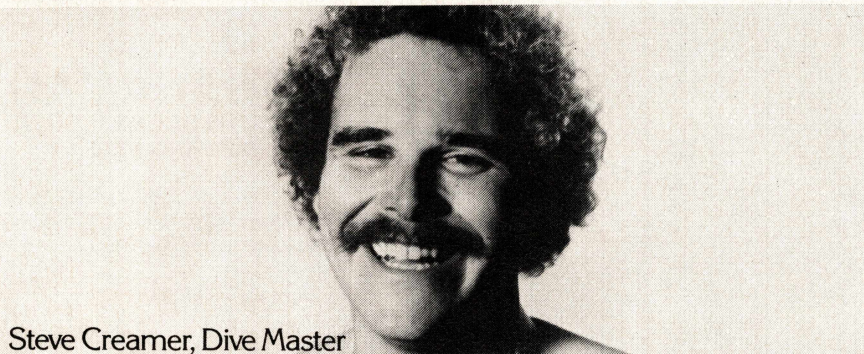
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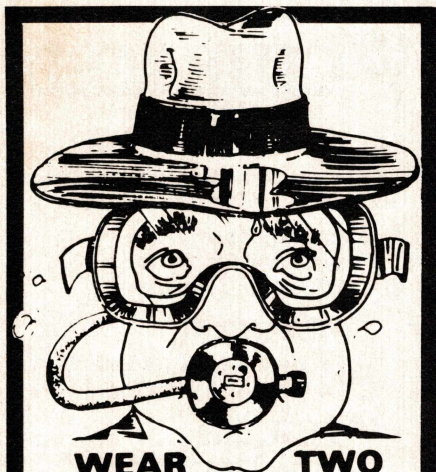
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CHIPOLA RIVER

sive display of Indian arrowheads and artifacts. His extensive collection is one of about seven or eight in the area. Even so the river still holds unbelievable amounts of treasure for the diver willing to take the time to explore.

There are four distinct stages of objects found within the depths of the Chipola. The first is from the prehistoric age when the ocean covered a much greater portion of the earth. Swimming within those depths were creatures such as the giant predecessors of the great white shark, that grew to lengths of 30 to 50 feet. The second stage of objects is the Indian artifacts of different tribes and times dating back 400-10,000 years or more. These include tools, arrowheads and pottery from tribes living along the river, as well as nomadic tribes. The third stage is the artifacts of the early explorers and settlers who used the river for transportation and commerce. Objects from this period include muskets, musket balls, tools, porcelain trading pipes, bottles and logging chains from the early days of the Civil War to the early 20th century. The fourth stage is the artifacts of a more recent vintage, such as bottles and tools from the '30s, '40s and '50s, to the artifacts of the '70s and '80s—the signs of modern man's existence.

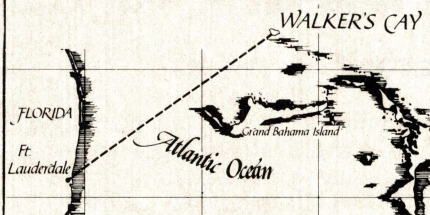
Artifacts and fossils can be found anywhere in the river, but it is south of the city of Marianna where the majority of diving is done.

The most popular method of diving is done by anchoring the boat in a likely area and working your way upstream by pulling yourself along the limestone croppings and ledges. It is within these limestone pockets that gravel and sand have held their secrets for ages. By keeping a keen eye out and carefully fanning the gravel and bottom, the objects come into view. Broken pieces of pottery, manatee bones and ribs are common, but it is the fossilized shark and mastodon teeth and arrowheads which are the sought-after treasures. Since the river is shallow, with depths averaging 5-15 feet, bottom time can be considerable, even if you're working your way upstream against the current.

The abundance of pottery is puzzling until you learn that one of the tribes that once lived along the Chipola, the Catots, used to break the bottoms of their pots and destroy them every year. This was done either out of superstition or sanitation, but for whatever reason, the evidence is that through the years, they destroyed a lot of pots. It makes one stop and reflect about these people when relics of their past are recovered.

There are plenty of areas of the river to dive, each being equally beautiful and se-

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rene, with huge oaks and cypress trees lining the limestone banks. Canoers as well as divers enjoy the unpolluted beauty of the Chipola River. All along the river you can see the rare Barbaride turtle sunning itself on logs and along the banks, as well as underwater. This is one of the only places in the world to find this rare species of turtle.

One of the added treats of visiting the Chipola is to explore the spring-fed tributaries that feed the river. We followed one such spring back to its source approximately one-eighth mile from the river. The creek wound its way through lush foliage and ferns where it ended in a quiet pool of crystal-clear spring water. Areas such as this are what give the Chipola its name, which means "sweet water" in Indian dialect.

The best time of the year to dive the Chipola is from July to November, when the river level is down and the clarity of the water is at its best. A wetsuit is a must for protection from the cool temperature of the water and to avoid cuts and scrapes from the limestone bottom. Each diver should have a float line with a dive flag for safety from boat traffic. The shallow depths and winding travels of the river make this a must for safety, along with being the law.

Artifact diving is a rewarding and enjoyable part of the underwater world. Learning to recognize the artifacts and fossils is necessary to be able to maximize the enjoyment of the sport. Any substantial or questionable finds in Florida should be directed to the Department of Natural Resources in Tallahassee.

For more information on diving this beautiful section of Florida, contact Hines Robertson at Robertson Skin Diving School in Dothan, Alabama.

With a little luck and practice, you will be able to enjoy the adventures of artifact diving and ponder the mystery and history of objects found in this river, a liquid time capsule.



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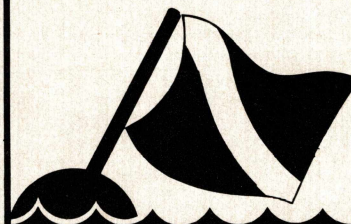
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Historical Scapa Flow

TEXT AND PHOTOGRAPHY BY BOB MICHELSON

Rain, fog, storms and rough seas, along with sunshine and blue skies, make up the entire palette of varying weather conditions you can expect if you plan a dive vacation in the Orkney Islands. This is a peaceful, sleepy group of green islands, with the natural harbor of Scapa Flow, just a short ferry ride from the northern coast of Scotland. It has awakened only a few times in the past 70 years to participate in short but violent chapters in maritime history.

October 1939: The Second World War is just weeks old, and a German U-boat under the command of Kapitän-Lt. Gunter Prien sneaks into Scapa Flow under the cover of darkness and torpedoes the British battleship HMS *Royal Oak*. The entire British Admiralty is in a state of shock; Scapa Flow, the most secure harbor, and home of the Grand Fleet, has been penetrated by the enemy.

Our sights, however, are trained on an event 20 years and one World War farther back in history; the wrecks of the Imperial German Navy, which scuttled itself in Scapa Flow on June 21, 1919.

The 74 ship fleet, including 10 battleships, was interned in Scapa Flow after the signing of the armistice in November 1918. The entire fleet was to be turned over to the allied powers as reparations for war damages. Deciding this would be a disgrace to the code of honor for his officers, the commanding German admiral issued the fateful order on June 21 directing the officers and crew to scuttle their ships. Since the major portion of the guarding British Fleet was away on sea maneuvers it was not possible for them to stop the scuttling or to save any of the ships. A few ships were beached while sinking but the majority of the German fleet went to the bottom of Scapa Flow.

In a spectacular salvage operation from 1924 to 1939 all but ten of the ships were raised and scraped, but those remaining provide a wreck diving vacation so varied that only Truk Lagoon could be compared to it.

You could spend your entire vacation diving a different wreck every day. If you dive one of the 200 meter long, 30 meter wide battleships, you could spend your entire dive vacation on one ship and never see it all. The flow is a wreck diver's paradise. In addition to three battleships there are four light cruisers and three destroyers on the bottom. There are also two German U-boats of WW I vintage that were sunk while attempting to invade the flow. There is also the HMS *Vanguard*, a British heavy cruiser which blew up in 1916 owing to an internal explosion in its

ammunition bunker. Countless other wrecks are scattered around Scapa Flow, including the "blockships," deliberately sunk by the British to block the channels between the islands. Except for the *Royal Oak*, an official war grave, all of the wrecks are diveable. Depths range from four meters on the blockships to 45 meters on the battleships.

A day's diving begins around 9:00 in the morning when the boat leaves the pier and starts the one and one-half hour run to the wreck sites scattered around the island of Cava. Because of the lack of currents and the difficulty of anchoring on the wrecks, only a marker buoy on a shot line is set to mark the position of the wreck. The dive boat stays mobile and picks up the divers in the open water where they surface. Divers are free therefore to explore the wrecks without having to make their way back to an anchor line.

During our first dive, on a battleship, with visibility averaging 10-12 meters, we are almost on the wreck before it comes into view. We are overwhelmed by its size. Some of the wrecks lie on their port or starboard sides and we can orient ourselves quickly, but on the battleships, which are partly turned over and resting on their superstructures, orientation is difficult. At first we are very surprised to find the wrecks in such good condition. Since only the flood valves were opened to cause the sinking, the ships suffered little damage. The wrecks are covered with the typical growth of the northern European waters, mainly anemones and dead man's hands, but completely free of any kelp. Portholes and hatchways cast their magical-mystical spell, literally crying out "Come in and explore me!" but even in the shine of our powerful lamps the interiors of the ships remain black. Without the proper gear, a penetration into these wrecks is suicidal and we limit ourselves to exploring the wrecks from the outside.

We continue our way along this seemingly never ending wreck, accompanied by the watchmen of the deep, lone codfish of majestic size or an occasional school of mackerel or pollock. Here we find the superstructure of the battleship with its battle control tower pointing away from the wreck into the emptiness beyond. The 12 inch cannons, still in their mounts, point uselessly at a nonexistent enemy. Finning along the deck we find the chute that leads into the coal bunkers. The deck hatch is missing and in the beam of our lights we see football sized chunks of coal still shining on the edges as if the ship had just sunk a day ago.

(Continued on Page 96)

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IKELITE EXT. TUBE SET FOR 35MM 84.50
NIKONOS CLOSE-UP KIT W/CASE F/NIKONOS I1/I11 109.00
NIKONOA CLOSE-UP KIT W/CASE F/NIK. I1/I11/IV 119.00
OCEANIC EXT. TUBE W/FRAMER 1:2 FOR 35MM 39.50
AMF SWIMASTER STROBE W/TRAY FOR NIKONOS I11 87.50
HELIX AQUAFLASH 22 W/ARM & TRAY FOR NIKONOS I11/IV 225.00
HONEYWELL 880 STROBE W/IKELITE HOUSING 179.00
IKELITE HOUSING FOR HONEYWELL 610, 900 880, 882 99.00
IKELITE HOUSING FOR VIVITAR 283 59.00
IKELITE HOUSING FOR CANON 155A 59.00
IKELITE SUBSTROBE MS (DEMO) 99.00
NOVATEK I1 STROBE W/ARM, TRAY, METER 165.00
MOUNT FOR NIKONOS I1
OCEANIC OS-2000 W/TRAY & ARM FOR NIKONOS I11 139.00
OCEANIC OS-2000 W/TRAY & ARM FOR NIKONOS IV 139.00
OCEANIC 2001 SLAVE STROBE 269.00
OCEANIC 2000 W/TRAY, CASE & ARM FOR NIKONOS I1 159.00
SUBSEA MK150 W/EO CONN. 345.00
SUNPAK MARINE 28 W/NI-CAD, M CHARGER & TRAY FOR NIKONOS I11 159.00
SUNPAK MARINE 28 W/TRAY FOR NIKONOS I11 169.00
TOSHIDA TM-2 W/TRAY FOR NIKONOS I11, IV & V 135.00
IKELITE HOUSING FOR VIVITAR 830, 835 840, OR 845 WITH CLOSE-UP 39.95
BOLEX ALUMINUM HOUSING FOR EBM 1750.00
BOLEX H-16 ALUMINUM HOUSING FOR H-16 695.00
HASSELBLAD ALUMINUM HOUSING FOR SWC 975.00
HELIX/KAMBA HOUSING FOR CANON "A" SERIES 239.00
IKELITE HOUSING FOR CANON 814 89.00
IKELITE HOUSING FOR HASSELBLAD 500C 363.00
IKELITE HOUSING FOR JVC GZ-53 & HR-C3 450.00
IKELITE HOUSING FOR CANON F-1 W/SPEEDFINDER & DOME PORT 179.50
IKELITE HOUSING FOR NIKON F-2 W/MOTOR 199.00
IKELITE HOUSING FOR OLYMPUS OM1, OM2 & OM10 149.00
IKELITE HOUSING WITH EO CONN. FOR CANON F-1 W/SPEEDFINDER 225.00
OCEANIC ALUMINUM HOUSING FOR CANON F-1 (OLD STYLE) 595.00
HANIMEX 110 AMPHIBIAN CAMERA 59.00
HYDRO PHOTO COBRA ARM, 19" 60.00
IKELITE T-CONNECTOR 18.50
IKELITE HOUSING FOR GOSSEN SUPER PILOT 32.50
IKELITE TRAY FOR NIKONOS IV & I.C.S. 34.95
IKELITE I.C.S. TO NIKONOS I11/IV ADAPTER 27.50
IKELITE TRAY WITH HANDLE FOR NIKONOS I1 15.00
OCEANIC PRO GRIP TRAY FOR NIKONOS I11 20.00
SUBSEA TRAY FOR NIKONOS I1/I11 14.50
USED EQUIPMENT IS SOLD SUBJECT TO YOUR APPROVAL

110 & DISC CAMERAS

HANIMEX AMPHIBIAN 110 \$ 89.50
HANIMEX CLOSE-UP LENS FOR AMPHIBIAN 110 35.00
HANIMEX/IKELITE PKG WITH CAMERA & SUBSTROBE S SLAVE STROBE 189.50

SPECIAL PURCHASE

HANIMEX PENGUIN HOUSING FOR KODAK DISC 4000 (RATED TO 12 FT.) 17.95

IKELITE HOUSING FOR 110 CAMERAS CALL

IKELITE CLOSE-UP LENS FOR 110 TRIMCASE 17.95
IKELITE SPORTFINDER I1 FOR 110 & DISC HOUSING 5.95

SPECIAL PURCHASE

IKELITE/VIVITAR PACKAGE WITH HOUSING, VIVITAR S/B 845CAMERA, CLOSE-UP LENS & SPORTFINDER 74.50

IKELITE/KEYSTONE PACKAGE WITH 110 CAMERA & HOUSING 79.50

IKELITE HOUSING FOR KODAK DISC 2000, 3000 3100, 3500 & 4000 43.95

SEA & SEA POCKET MARINE 110 109.50
SEA & SEA MACRO LENS W/WAND 39.95
SEA & SEA SEALOC BULKHEAD 32.00

SEA & SEA/IKELITE PACKAGE WITH CAMERA, SUBSTROBE S & ARM 209.95
SEA & SEA PACKAGE WITH CAMERA, SEALOC BULKHEAD, YS-20 STROBE & ARM 275.00

NIKONOS CAMERAS & LENSES

NIKONOS V WITH 35MM F2.5 LENS WITH SPARE O-RING, GREASE & BATTERY CALL
NIKONOS V BODY WITH SPARE O-RING, GREASE & BATTERY CALL
15MM NIKKOR U/W LENS 699.00
13MM F3.5 SEA & SEA LENS FOR NIKONOS 369.00
28MM F3.5 U/W NIKKOR LENS 164.00
28MM F2.8 NIKKOR FOR ABOVE WATER USE ONLY 129.00
35MM F2.5 U/W NIKKOR LENS 84.00
80MM F4.0 U/W NIKKOR LENS 164.00

HELIX SPECIAL

NIKONOS V PACKAGE WITH 35MM UWN, DIVE LIGHT & SUBSEA LIGHTWEIGHT CASE (18X13X6") 404.00
AS ABOVE (NIKONOS PACKAGE) PLUS AQUAFLASH 28 & LIGHT MOUNT 724.00
AS ABOVE (NIKONOS V PACKAGE) WITH EXT. TUBE SET (1:1, 2:1 & 2:1) 473.00
DELUXE NIKONOS V PACKAGE SAME AS ABOVE PLUS AQUAFLASH 28, LIGHT MOUNT, DIVE LIGHT, EXTENSION TUBE SET & THE UNDERWATER PHOTOGRAPHER'S HANDBOOK! 794.00

NIKONOS PC ADAPTER FOR NIKONOS I11 18.50
NIKONOS PC ADAPTER FOR NIKONOS IV 19.50
NIKON CC30R FILTER 52MM 13.00
NIKON UV (L-37) FILTER 52MM 14.40
NIKON LEM HOOD/FILTER HOLDER FOR 35/80 UWN 4.25
NIKONOS O-RING SET FOR NIKONOS V 4.95
NIKONOS O-RING SET FOR NIKONOS IV 4.95
NIKONOS O-RING SET FOR NIKONOS I11 7.00
HELIX O-RING SET FOR NIKONOS I11 3.95
HELIX O-RING SET FOR NIKONOS I11 3.95
NIKONOS O-RING SET FOR SB-101 3.95
NIKONOS O-RING SET FOR SB-102 4.95
NIKONOS REAR LENS CAP 4.50
NIKONOS FRONT LENS CAP FOR 15MM UWN 26.00
NIKONOS FRONT LENS CAP FOR 28, 35, 80 UWN 4.50
NIKONOS RUBBER LENS HOOD FOR 35 UWN 4.25
OCEANIC NIKONOS SYNC PLUG 4.95
OCEANIC O-RING SET FOR NIKONOS I1 3.95
UR PRO MARINE FILTER (58MM) 42.50

SPECIAL PURCHASE

PROTECT YOUR INVESTMENT WITH AN EVEREADY CASE FOR NIKONOS 3 OR 4/5 QUANTITIES LIMITED. \$14.95 EACH
EXPIRES 12/31/84

OTHER 35MM CAMERAS

HANIMEX AMPHIBIAN 35MM \$ 157.50
HANIMEX CASE FOR ABOVE 11.00
HANIMEX CLOSE-UP FOR ABOVE CALL
HANIMEX/IKELITE PACKAGE WITH CAMERA & EXT. SUBSTROBE S SLAVE STROBE 264.00
RICOH AD-1 CAMERA W/HOUSING 199.00
RICOH STROBE 149.00
SEA & SEA MOTOR MARINE 159.50
SEA & SEA WL-24 WIDE LENS ADAPTER (24MM) 125.00
SEA & SEA CU-3 CLOSE-UP LENS 24.00
SEA & SEA CU-4 MACRO LENS W/WAND 46.50
SEA & SEA UT-1 UNIV. TRAY W/GRIP 64.00
SEA & SEA SEALOC BULKHEAD 32.00
SEA & SEA/IKELITE PACKAGE W/CAMERA, SUBSTROBE S & ARM 264.00

HOUSINGS

U-F EWA FLEXIBLE "MASTER" SERIES 8X5X6-1/4" \$ 64.95
U-FXP EWA FLEXIBLE "MASTER" SERIES 9X6X7-1/2" 74.00
U-FXM EWA FLEXIBLE "MASTER" SERIES 6-1/2"x5-1/2"x7" 82.00
U-FPN EWA FLEXIBLE "MASTER" SERIES 8X6-1/2X6-1/2" 82.00
U-FGM EWA FLEXIBLE "MASTER" SERIES 10-1/2X10X7-1/4" 82.00
U-H EWA FLEXIBLE "MASTER" SERIES FOR HASSELBLAD-BRONICA 98.00
HUGYFOT UFOMARIN ALUMINUM HOUSING FOR 350.00

OLYMPUS OM-1, OM-2 W/EO OR NIKONOS I11/IV CONNECTOR
HUGYFOT AS ABOVE BUT FOR NIKON EM/FG IKELITE HOUSING FOR CANON SUPER SURE SHOT 79.95
IKELITE HOUSING FOR NIKON F2/3 W/ACTIONFINDER 199.00
IKELITE HOUSING FOR CANON F1N W/SPEEDFINDER 199.00
IKELITE SUPREVEY HOUSING FOR SLR CANON, FUJICA, MINOLTA, NIKON, OLYMPUS & PENTAX 239.95
IKELITE MOTORDRIVE SUPREVEY HOUSING FOR SLR CANON, NIKON & OLYMPUS 263.95
IKELITE SIDE HANDLE & TRAY 23.95
IKELITE SIDE MOUNTING BAR 8.95
IKELITE T-CONNECTOR 23.95
IKELITE ICS TO NIKONOS I1 ADAPTER 31.95
IKELITE ICS TO NIKONOS I11/IV ADAPTER 31.95
IKELITE ICS EO ADAPTER 31.95
OCEANIC HYDRO 35 HOUSING FOR CANON F-1 (OLD) 839.00
NIKON F, F2 OR F3
OCEANIC HYDRO 35 HOUSING FOR CANON F1N 1039.00
OCEANIC HYDRO 35 HOUSING FOR NIKON F2 939.00
WITH MOTOR
OCEANIC EO BULKHEAD 35.00
OCEANIC FISHEYE PORT 185.00
OCEANIC FLAT PORT 139.00
SEA & SEA ALUMINUM HOUSING FOR NIKON F2 795.00
TUSSEY T-300 ALUMINUM HOUSING FOR NIKON F2/FM2 OR CANON AE1 PROGRAM 459.00

STROBES & ACCESSORIES

HELIX HSA SHORT ARM, 8" F/AQUAFLASH 22-28 9.95
HELIX HLM LIGHT MOUNT 10.50
HELIX 6" EO TO NIKONOS I1/I11 52.00
HELIX 6" EO TO NIKONOS I11/IV/V 52.00
HELIX 10FT MALE/FEMALE EO EXTENSION 95.00
HELIX 20FT MALE/FEMALE EO EXTENSION 99.00
IKELITE SUBSTROBE S FOR TRIM OR DISC HOUSING 94.00
IKELITE SUBSTROBE HANIMEX OR SEA & SEA 104.50
IKELITE SUBSTROBE WITH NELSON CONNECTOR 123.00
IKELITE SUBSTROBE M (REQ. OPTIONAL SYNC CORD) 104.00
IKELITE SUBSTROBE MS SLAVE 123.00
IKELITE SUBSTROBE 150 (REQ. OPTIONAL SYNC CORD) 355.00
IKELITE SUBSTROBE 225 (REQ. OPTIONAL SYNC CORD) 399.00
IKELITE 12V AUTO CHARGER FOR 150/225 12.00
IKELITE MODULAR CHARGER (110/220) FOR 150/225 16.00
IKELITE QUICK CHARGER (110) FOR 150/225 26.00
IKELITE FLASH MONITOR (AUTO SENSOR) FOR M, 75, 150 OR 225 63.95
IKELITE PC SYNC CORD 23.95
IKELITE ICS SYNC CORD 23.95
IKELITE NIKONOS I11/IV/V SYNC CORD (SURFACE ONLY) 39.95
IKELITE NELSON SYNC CORD 55.95
IKELITE EO SYNC CORD 79.95
IKELITE STROBE MOUNT I 23.95
IKELITE STROBE MOUNT II 39.95
IKELITE QUICK MOUNT I FOR 75, 150 OR 225 55.00
IKELITE UNIVERSAL TRAY FOR NIKONOS, SEA & SEA & HANIMEX 15.95
IKELITE CONSOLE FOR NIKONOS IV 48.00
IKELITE HANDLE FOR UNIV. TRAY OR CONSOLE 16.00
IKELITE HOUSING FOR VIVITAR, CANON, SUNPAK, STROBES & ETC. 79.95-119.95

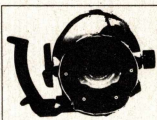
HELIX SPECIAL

IKELITE/VIVITAR PACKAGE WITH HOUSING & VIVITAR 283 129.50
IKELITE/VIVITAR PACKAGE AS ABOVE WITH VIVITAR 285 139.00

NIKONOS SB-101 SPEEDLITE 309.00
NIKONOS SB-102 SPEEDLITE W/CASE & DIFFUSER 559.00
NIKONOS SB-103 SPEEDLITE W/CASE & DIFFUSER CALL
OCEANIC 2000 (SPECIFY NIKONOS I1, I11/IV/V) 119.95
OCEANIC 2000 WITH EO 139.95
OCEANIC 2000 SLAVE WITH HANDLE 115.00
OCEANIC 2001 (SPECIFY NIKONOS I1, I11/IV/V) 299.00
OCEANIC 2001 WITH EO 319.00
OCEANIC 2001 SLAVE WITH EO 329.00
OCEANIC 2003 WITH 2-POWER RANGES & EO 335.00
OCEANIC 3002 WITH AUTO FUNCTION (REQ. OPTIONAL CORD) 390.00
OCEANIC CORD FOR 3002 WITH NIKONOS I11/IV/V CONN. 98.00
OCEANIC 3003 WITH 2-POWER RANGES & SLAVE (REQ. OPTIONAL CORD) 359.00
OCEANIC CORD FOR 3003 WITH NIKONOS I11/IV/V CONN. 73.00

Helix/Kamba Housing

HELIX/KAMBA HOUSING FOR CANON "A" SERIES	299.50
HELIX/KAMBA HOUSING FOR NIKON EM	229.50
HELIX/KAMBA INTERNAL VIEWFINDER	53.50
HELIX/KAMBA MACRO PORT	135.00
HELIX/KAMBA EXTRA WIDE DOME PORT	135.00
HELIX/KAMBA FLASH BRACKET (UNIV. MT.)	18.00
HELIX/KAMBA FLASH BRACKET (AQUAFASH MT.)	18.00



Helix Auto-Marine Housing

HELIX AUTO-MARINE HOUSING FOR NIKON L35AF	74.50
HELIX AUTO-MARINE HOUSING FOR CANON AF35M	74.50
HELIX AUTO-MARINE HOUSING FOR CANON AF35M2	74.50
HELIX AUTO-MARINE HOUSING FOR MINOLTA AF-SV	74.50
HELIX AUTO-MARINE HOUSING FOR PENTAX PC35AF	74.50
(REQUIRES OPTIONAL WINDER)	
HELIX/NIKON PACKAGE WITH HOUSING & L35AF	199.50
HELIX/CANON PACKAGE WITH HOUSING & AF35M2	199.50



OCEANIC CORD FOR 3003 WITH EO CONN.	98.00
OCEANIC PRO GRIP TRAY FOR NIKONOS II	27.50
OCEANIC PRO GRIP TRAY FOR NIKONOS III	27.50
OCEANIC CAMERA TRAY FOR NIKONOS IV	20.50
OCEANIC PRO GRIP TRAY WITH UNIV. SHOE FOR NIKONOS II	31.50
OCEANIC PRO GRIP TRAY WITH UNIV. SHOE FOR NIKONOS III	31.50
OCEANIC CAMERA TRAY WITH UNIV. SHOE FOR NIKONOS IV	23.50
OCEANIC METER MOUNTING BRACKET FOR L-164	16.00
OCEANIC METER MOUNTING BRACKET FOR L-158 OR L188	16.00
OCEANIC ARM-2000 ARM FOR 2000 TO PRO GRIP TRAY	37.95
OCEANIC ARM-015 ARM 15" F/STROBE TO UNIV. SHOE	67.00
OCEANIC ARM-04 ARM 21" F/STROBE TO UNIV. SHOE	69.00
OCEANIC ARM-028 ARM 28" F/STROBE TO UNIV. SHOE	72.00
OCEANIC ARM-ADAPTER FOR 2000 TO ARM-015, 021, 028	8.00
OCEANIC 6" EO TO NIKONOS I/II	70.00
OCEANIC 90 DEGREE EO TO NIKONOS I/II	88.00
OCEANIC 6" EO TO NIKONOS III/IV/V	70.00
OCEANIC 90 DEGREE EO TO NIKONOS III	88.00
OCEANIC 90 DEGREE EO TO NIKONOS IV	88.00
OCEANIC EO SLAVE ADAPTER	79.00
SEA & SEA YS-20 STROBE FOR NIKONOS I/II	157.50
SEA & SEA YS-20 STROBE WITH SEALOC	165.00
SEA & SEA YS-50 STROBE FOR NIKONOS III/IV/V	237.00
SEA & SEA YS-50 AUTO STROBE FOR NIKONOS III/IV/V	299.00
SEA & SEA YS-150 WITH SLAVE FOR NIKONOS II	433.50
SEA & SEA YS-150 WITH SLAVE FOR NIKONOS III/IV/V	433.50
SEA & SEA YS-150 WITH SLAVE AND SEALOC	441.00
SEA & SEA SA-2 ARM FOR YS-150	65.00
SEA & SEA SA-3 FLEX ARM FOR YS-50	65.00
SEA & SEA CAMERA TRAY & HANDLE FOR NIKONOS II	33.50
SEA & SEA CAMERA TRAY, THUMB RELEASE & HANDLE FOR NIKONOS III	44.50
SEA & SEA CAMERA TRAY FOR NIKONOS IV	25.50
SEA & SEA SEALOC TO NIKONOS I/II ADAPTER	33.50
SEA & SEA SEALOC TO NIKONOS III/IV/V ADAPTER	33.50
SUBSEA MK30 FOR NIKONOS I/II (2 "C" CELLS)	139.00
SUBSEA MK30 FOR NIKONOS III/IV/V (2 "C" CELLS)	139.00
SUBSEA MK30 WITH EO	149.00
SUBSEA MK100 FOR NIKONOS I/II (REQ. OPTIONAL 493)	315.00
SUBSEA MK100 FOR NIKONOS III/IV/V	315.00
SUBSEA MK100 WITH EO	325.00
SUBSEA MK150 FOR NIKONOS I/II (REQ. OPTIONAL 497)	449.00
SUBSEA MK150 FOR NIKONOS III/IV/V (REQ. OPTIONAL 497)	449.00
SUBSEA MK150 WITH EO (REQ. OPTIONAL 497)	455.00
SUBSEA FLEXIBLE ARM, 17"	61.95
SUBSEA STANDARD ARM, 12"	49.25
SUBSEA UNIVERSAL CAMERA TRAY MK-30 FOR NIKONOS I/II/III/IV	22.25
SUBSEA UNIVERSAL CAMERA TRAY FOR NIKONOS I/II/III/IV/V	22.25
SUBSEA HANDLE	31.50
SUBSEA METER MOUNT FOR L-164B	27.95
SUBSEA METER MOUNT FOR L-158 & L-188	18.75
SUBSEA DOUBLE NIKONOS TRAY (II/III)	31.50
SUBSEA STROBE JACKET FOR MK-150	28.00
SUBSEA 6" EO TO NIKONOS I/II	59.75
SUBSEA 6" EO TO NIKONOS III/IV/V	59.75
SUBSEA POWER PACK 200 W/CHARGER (510V)	149.00
SUBSEA NI-CAD FOR POWER PACK (SPARE)	56.25
SUBSEA REPLACEMENT CIRCUIT BOARD FOR MK-150	55.00
SUNPAK MARINE 32 FOR NIKONOS III/IV/V	219.00
SUNPAK CL-2 NI-CAD PACK FOR MARINE 32	24.75
SUNPAK QBC-5 CHARGER FOR CL-2	24.75

FINDERS FOR NIKONOS

IKELITE OPTICAL VIEWFINDER	\$ 59.00
IKELITE SPORTSFINDER	7.20
NIKONOS 15MM OPTICAL VIEWFINDER DF-11	159.00
NIKONOS 28MM SPORTSFINDER	11.60
NIKONOS 35/80 SPORTSFINDER	12.00
NIKONOS 80MM OPTICAL VIEWFINDER(SURFACE ONLY)	57.50
NIKONOS 28/35MM OPTICAL VIEWFINDER	85.00
OCEANIC OPTICAL VIEWFINDER FOR NIKONOS III	45.00
SEA & SEA OPTICAL VIEWFINDER (18, 28, 35)	48.00

EXTENSION TUBES FOR NIKONOS

AQUACRAFT TUBE W/FRAMER (1:1 FOR 35 UWN)	\$ 49.50
AQUACRAFT TUBE W/FRAMER (1:2 FOR 35 UWN)	49.50
AQUACRAFT TUBE W/FRAMER (1:3 FOR 35 UWN)	49.50
AQUACRAFT TUBE W/FRAMER (1:2.75 FOR 28 UWN)	49.50
AQUACRAFT EXTENSION TUBE SET FOR 35 UWN	109.50
IKELITE EXTENSION TUBE SET FOR 35 UWN (1:1, 1:2, 1:3)	110.50
IKELITE EXTENSION TUBE W/FRAMER (1:1 F/35 UWN)	42.50

IKELITE EXTENSION TUBE W/FRAMER (1:2 F/35 UWN)	42.50
IKELITE EXTENSION TUBE W/FRAMER (1:3 F/35 UWN)	42.50
OCEANIC EXTENSION TUBE SET FOR 35 UWN (1:1, 1:2, 1:3)	95.00
OCEANIC EXTENSION TUBE W/FRAMER (1:1 F/35 UWN)	44.00
OCEANIC EXTENSION TUBE W/FRAMER (1:2 F/35 UWN)	44.00
OCEANIC EXTENSION TUBE W/FRAMER (1:2 F/28 UWN)	44.00
SEA & SEA EXT. TUBE W/FRAMER (1:1 F/35 UWN)	46.00
SEA & SEA EXT. TUBE W/FRAMER (1:2 F/35 UWN)	46.00
SEA & SEA EXT. TUBE W/FRAMER (1:3 F/35 UWN)	46.00
SEA & SEA EXT. TUBE W/FRAMER (1:2 F/28 UWN)	46.00

CLOSE-UP & ADD-ON LENSES FOR UWN

HYDRO PHOTO T-1 CLOSE-UP FOR 35 UWN	\$ 39.95
HYDRO PHOTO T-2 CLOSE-UP FOR 35 UWN	39.95
HYDRO PHOTO T-3 CLOSE-UP FOR 35 UWN	39.95
HYDRO PHOTO 1228 CLOSE-UP FOR 28 UWN	39.95
HYDRO-PHOTO FOCUSING WAND FOR T-1 OR T-2	14.50
HYDRO-PHOTO FRAMED FOR 35 UWN	14.50
HYDRO PHOTO FRAMER FOR 28 UWN	14.50
NIKONOS CLOSE-UP OUTFIT	129.00
NIKONOS EXTENSION PARTS FOR CLOSE-UP	CALL
OCEANIC SUBWINDER II WITH OPTICAL VIEWFINDER (35 UWN TO 21MM)	319.00

LIGHT METERS & HOUSINGS

IKELITE HOUSING FOR GOSSEN SUPER PILOT	\$ 39.95
SEA & SEA LIGHT METER	69.50
SEKONIC L-164B MARINE METER II	94.50
SEKONIC L-158WH METER WITH HOUSING	41.00
SEKONIC L-188WH METER WITH HOUSING	54.00

EQUIPMENT CASE & BOXES

AQUACRAFT "GOODY" BOX (3X5-1/2X8-1/2")	\$ 6.95
HELIX ACCESSORY TOTE (9X4X5")	4.95
IKELITE PHOTO CASE (13X17X7")	47.95
IKELITE VIDEO RECORDER CASE W/10 OR 14 PIN BULK HEAD	80.00
PELICAN EQUIPMENT CASE (BLACK) (17-1/2X11-7/8X6-1/2")	64.50
PELICAN BOX WITH FOAM	11.95
SUBSEA EQUIPMENT CASE (18X13X12)	15.50
SUBSEA EQUIPMENT CASE (18X13X8)	165.00
SUBSEA EQUIPMENT CASE (18X13X6)	150.00
SUBSEA LIGHTWEIGHT CASE (18X13X6)	26.00

PHOTO/DIVE LIGHTS (CELLS NOT INCL.)

AQUALUME WITH KRYPTON BULB (3 "C" CELLS)	\$ 19.50
HELIX HUP-200 PHOTO/DIVE LIGHT (2 "D" CELLS)	14.95
HELIX HUP-205 MINI DIVE LIGHTS (2 "AA" CELLS)	9.75
HELIX HIGH INTENSITY CONVERSION KIT FOR HUP-200	4.95
IKELITE MINI-C LIGHT (4 "C" CELLS)	15.95
IKELITE MINI-C HALOGEN LIGHT (4 "C" CELLS)	19.95
IKELITE MINI-C HOLSTER	8.50
IKELITE MINI-C MARK STROBE BEACON	39.95
IKELITE MODULAR SUPER LIGHT IN CLEAR OR BLACK CASE (REQ. OPTIONAL CHARGER)	160.00
IKELITE MODULAR HANDLE OR PISTOL GRIP	7.20
TOSHIBA K-133 W/SPARE HALOGEN (4 "D" CELLS)	29.95
TOSHIBA K-132 W/SPARE KRYPTON (4 "D" CELLS)	24.95
UNDERWATER KINETICS SUPER-Q W/CHARGER	47.50
U-K OXL W/ CHARGER	59.00
U-K OXL LIGHT (3 "C" CELLS)	17.95
U-K UNIVERSAL HOLDER	10.50
U-K BELT HOLDER	6.50

MISCELLANEOUS ACCESSORIES

AQUACRAFT NIK. LENS FOCUSER	\$ 20.50
AQUACRAFT CAMERA SAFETY LINE (18 FT.)	12.95
AQUACRAFT CAMERA LANYARD	4.95
AQUACRAFT CAMERA SLATE FOR NIKONOS II/III	6.25
AQUACRAFT LARGE MESH TOTE BAG	19.50
BEALL REEL W/100FT OF LINE & SNAP	13.75
BEALL THUMB RELEASE (NIKONOS II)	8.95
BEALL THUMB RELEASE (NIKONOS III)	8.95
BEALL NIKONOS III MOUNTING SYSTEM	43.00
BEALL SEKONIC METER BRACKET FOR ABOVE	12.95
BEALL FLASH CONNECTOR COVE	2.55
BEALL WRIST LANYARD	4.85
BEALL SLATE	4.50
BEALL SLATE WITH PENCIL	8.10
CASIO W-100 DIVE WATCH (300 FT)	29.95
DISPOSABLE DIGITAL (MEN OR WOMEN)	9.95
GARRET XL-500 SEA HUNTER METAL DETECTOR	595.00

MOVIE/VIDEO

EUMIG NAUTICA S-8 (18 FPS)	\$ 189.00
FUJICA P-2 WITH HOUSING (18 FPS)	99.00
HELIX NAUTICA SINGLE LITE MOUNT	32.00
HELIX NAUTICA DOUBLE LITE MOUNT	39.95
IKELITE HOUSING FOR SUPER 8 MOVIE CAMERAS	159.95-239.95
IKELITE/CHINON PACKAGE WITH HOUSING & CHINON POCKET 8 CAMERA	125.00
IKELITE MODULAR 100W MOVIE LIGHT (REQ. OPTIONAL CHARGER)	160.00

IKELITE SPARE MODULAR NI-CAD	100.00
IKELITE HOUSING FOR BEAULIEU, CANON & BOLEX 16MM CAMERAS	399.95
IKELITE HOUSING FOR JVC GZ-S3 & HR-C3	575.00
IKELITE HOUSING FOR JVC GZ-S5 & HR-C3	575.00
IKELITE HOUSING FOR JVC TM-P3U 3" MONITOR	199.95
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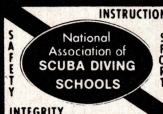
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SCAPA FLOW

(Continued from Page 92)

Our dive time rushes by all too quickly and after one last check of our pressure gauges we begin our ascent. On the way to the surface and during our safety decompression stop, I start to realize how little of the giant ship I actually have seen and hope that after a few days of diving on the wrecks we will be able to orient ourselves better and thus find our way around the wrecks with more ease.

One thing you can forget in your kit-bag when you come to the Orkneys is your hammer, crowbar, chisel and wrench. Everything that wasn't nailed down has already been picked off the wrecks by previous groups of divers and the dive operators are not allowing any divers on the wrecks with tools. Many of the local residents who worked on the big salvage jobs between 1924 and 1939 have rather large private collections of souvenirs taken from the ships; everything from officers' sabers to soup bowls and cups. One private collection in St. Marys and the public museum in Stromness are open to visitors.

After our dive gear is stowed and while the tanks are being filled for the afternoon dive we get underway for our midday break at one of the many little towns scattered around Scapa Flow. It could be to St. Marys or Stromness for a visit to the museum, a snack and a brew in one of the pubs, or we could head for Lyness. Here were the bases of operations for Cox & Danks salvagers and also Metal Industries, who carried on after Cox & Danks gave up operations. Lyness was also home for the British Navy from WW I until after WW II and a snorkel swim along the pier and in the shallow water has turned up many an old bottle, dish or cup, thrown off the pier years ago.

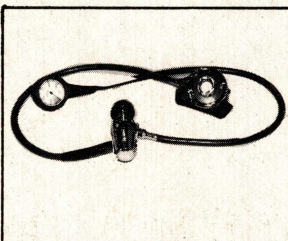
From the pier it is only a short walk to the Royal Navy Cemetary where a number of sailors from the German fleet, as well as British ships, are buried. Longhope is also an interesting stopping place with its two stone guard towers built during the War of 1812 to prevent American warships from attacking Scapa Flow. A short walk from the towers is the Longhope Lifeboat Station where you can see its modern rescue equipment. There are pubs and shops in all the little villages and a relaxing midday lunch and stroll is a welcome break between dives.

We all meet back at the pier around 2:00 pm to get underway for our second dive. Generally we're back home between 5:00 and 6:00 pm. Those of us who can't get enough diving in a day's schedule, can take a tank from the boat and make a night dive along the Churchill Barriers looking for lobsters and scallops. The Churchill Barriers are construct-

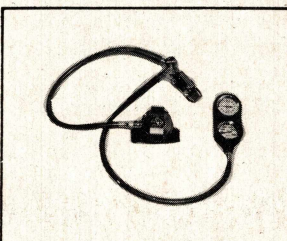


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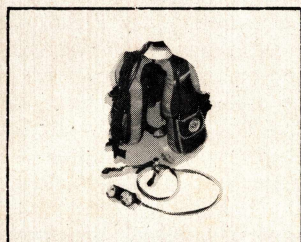


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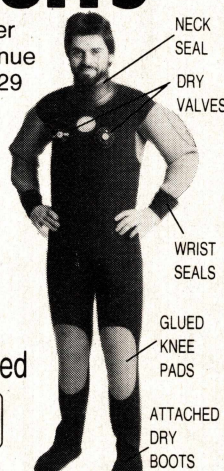
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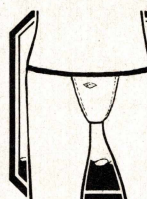
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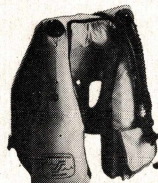
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SCAPA FLOW

ed of stone and concrete blocks, built during WW II to completely block the inter-island passages after the raid by U-boat Kapt. Prien.

Four different dive operations offer charters for groups of 12 divers maximum and bookings are made only on a group and weekly basis. Groups from all over Europe, the U.S. and Canada have made their way to Scapa Flow and for those who can't get a group together, there is a travel agency in New Jersey that offers dive tours to the Orkney Islands. Besides tanks, weights and air, no other dive equipment is available so you must bring all your own gear, including backpacks. All of the dive operations are able to assist you with bookings for accommodations. Cottages and apartment rentals are available as well as bed and breakfast or full board in the local hotels.

The skippers are all experienced seamen and divers. We chartered the *Crombie*, run by captains John Thornton and John Oxer, a 50 foot ex-pilot boat with lots of space for 12 divers and their gear. Along with a galley in the deckhouse the *Crombie* also has a head with hot and cold shower and four bunks below deck. A compressor delivering 15 cfm and 2,500 psi for the 24 72s and 86s rounds out the dive equipment. The *Crombie* is also equipped with radar, echo sounder and UHF radio and dives are very rarely canceled because of weather conditions. If the skipper will take his ship out, the dive is on.

In Scapa Flow, every day is filled with new dive experiences and memories and we can get over the disappointment of not being able to the dive the *Royal Oak*. Even today the wrecks of the Imperial German Fleet cause a commotion and furor in Scapa Flow, just as they did on the day of their arrival in November, 1918 and their sinking seven months later. Until recently, plans were being discussed to raise the remaining seven capital ships for their massive amounts of radioactive free steel, needed in the production of various scientific and medical instruments. However, in May 1983, the governing body of the Orkney Islands once and for all forbade any further salvaging of the wrecks; they see more value in them as a diver-tourist attraction to boost the local economy on a long term basis than for the short term profits that might be derived from the salvage.

And so, the ships of the Imperial German Navy will continue to rest on the bottom of Scapa Flow; gigantic and overwhelming. Sixty-five years and countless storms haven't been able to defeat or break these magnificent ships, but don't wait too long before you come to the Orkney Islands, nobody knows what mother nature will do to these ships in the next 65 years.

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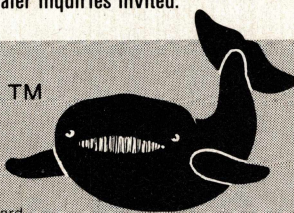
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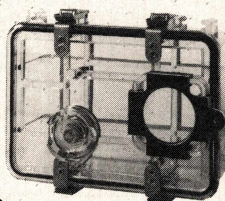
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TECHNIFACTS

(Continued from Page 40)

had chosen to work using the old Jack Brown drysuit and full facemask with a surface air supply. This type suit had a lightweight rubber face piece to which the mask sealed. However, there was no insulation between the rubber and the icy water. Daily headaches owing to intense cold resulted. The suit was never completely dry and this contributed to rapid chilling. For one diver and one tender a total of seven support personnel were required to cope with the air compressor, welding machine, cables, cutting rods and mostly, to keep a huge bonfire going topside near the exit hole in the ice so I could rewarm after every 20 to 25 minutes of submersion.

Other cold water dives involved working in ice and snow fed lakes behind dams. Such jobs always require more support than a comparable job in temperate conditions. It would have helped to have had shelters to aid in keeping both the diver and support crews warm.

Under ice sport diving is discussed quite fully in NAUI's *Cold Weather and Under Ice Diving*. Readers interested in ice diving should refer to this manual for safety procedures.

Open water arctic diving should be conducted only from a boat. This means one that provides safe transport as well as shelter for the divers before, between and after the dives. Some form of heat should be available.

In addition to the dive buddy, support personnel must include topside helpers who will immediately assist the divers onto the boat and into the cabin. If another dive is to follow, topside helpers change tanks and readjust equipment for the second dive; all while divers and helpers are inside the cabin of the boat. Dive teams can rotate duties so each group can serve as helpers, then make a dive.

THE ARCTIC DIVER

Arctic water quickly drains a diver's energy. Russel Kunibe estimates a diver in extremely cold water is working at only about 25 percent of his normal temperate climate capabilities. It is mandatory that cold water divers have adequate pre-dive rest and a highly nutritious diet. NAUI suggests at least six to eight hours sleep and an intake of at least 5,000 calories per day. Marine Service and Diving declines to accept cold water dive charters from divers who are drinkers, drug users or heavy smokers. Vasodilation in the skin leads to problems.

A diver must always eliminate himself from a dive plan if he feels the proposed underwater venture exceeds his own capabilities. This precaution is even more critical in polar diving conditions.

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The concept of buddy diving is even more important in cold water diving than in temperate water diving. Possibly the first indications that hypothermia is affecting a diver will be noted by his/her buddy who can then take steps to get the diver to safety.

EQUIPMENT

Most divers have strong preferences for certain types of diving equipment. There is no reason some basic equipment cannot be used for cold water diving with good results. This includes fins, diver's knife, snorkel and weightbelt. But, even these may require slight modification. For example, the weightbelt will have to carry more lead owing to the increased buoyancy of heavy underclothing and a full drysuit. A secure belt fastener must be used to prevent accidental loss of the belt.

With ice on the surface a snorkel should only be used if the dive is being terminated. Regulators have a tendency to freeze up when the diver is surface swimming in freezing air. Equipment should be selected that is known to work well under arctic conditions.

The modern variable-volume drysuit offers the best protection against cold water. These vary slightly in design. Suits with attached hoods are the warmest. Russel Kunibe suggests wearing a thin, lightweight neoprene hood under the heavier suit hood.

Both Carr and Kunibe report they get the best protection from cold water by wearing woolen underwear. Thinsulate underwear by DUI (Diving Unlimited International, Inc.) is also warm.

A good buoyancy compensator should be worn with all exposure suits. These can lose buoyancy if a leak develops and flotation may be urgently required.

A regulator used in cold water must also be selected with care. Regulators have a tendency to freeze-up and either freeflow or suddenly stop providing air. They malfunction because scuba tank air, which contains some moisture, is already near freezing. When it expands in the regulator, it is cooled to the freezing point and ice forms on springs and other parts. Usually the regulator freeflows, but occasionally it will stop providing air. The Alaska dive shop uses all-environment regulators with "arctic cups" filled with an anti-freeze liquid that has prevented almost all regulator malfunctions under even the coldest conditions. Also, regulators having mostly Teflon or Teflon coated parts have proven less likely to freeze than regulators with all metal parts.

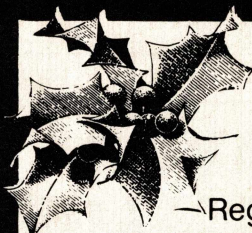
In Alaska diving, more regulator freeze-up was experienced while divers were on the surface than while they were underwater. Do not remove your regulator from your mouth unless the dive has been completed. Purging a regulator, which causes an excess flow of moist air, can contribute to freeze-up.

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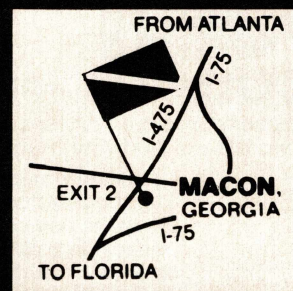
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HYPOTHERMIA

Dr. Bove in RX for Divers (SDM, July '84) covered some aspects of hypothermia. Carr and Kunibe, experienced cold water divers, add these thoughts. Every diver should take note when an extremity starts to feel cold as the circulation shuts down. The diver will start to feel very tired, fatigued. Cramps are also an indication of muscle fatigue and lack of good circulation. When you first start getting cold shivering will occur. If you have stopped shivering there is danger of hypothermia. Carr says his first warning of being too cold is a feeling of frustration.

A buddy diver should monitor his/her dive partner. Watch for slow responses, slow movements and sluggish actions. If you can look into your partner's eyes and they respond to movement slowly and jerkily, hypothermia is probably setting in. Frequent periods of complete inactivity on the part of a diver may also indicate the onset of mild hypothermia.

If any signs or symptoms of excessive cold develop in either diver the dive should be aborted and warmth of the cabin sought to restore circulation and body temperature. Divers must be aware that topside cold will be worse than cold water. Get to the surface and to warmth while you are still capable.

The *Navy Diving Manual* states, "An individual thoroughly conditioned physically can be transported from tropical into polar regions and immediately begin div-

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ing without deleterious effects." Carr and Kunibe feel that a diver who wants to experience the challenge of arctic diving should have at least 100 hours of open water diving.

Finally, Technifacts suggests that arctic diving is not for everyone. A diver who wants to experience an unusual dive should do so with the understanding that all instructions from an experienced guide will be followed and that the dive will be terminated when the guide feels any condition indicates safety is being jeopardized. Cold water diving can be almost fun and certainly can be exhilarating. If you are qualified, try it at least once. 

SCALLOP DIVING

(Continued from Page 51)

place where water might be funneled and cause an increased flow.

Unlike mussels and clams, the scallop has an enlarged adductor muscle, developed for powerful opening and closing of the shells. This muscle enables the scallop to actually swim around when escaping natural predators, such as starfish.

Scallops are also related to oysters and both of these shellfish share a unique feature: They produce pearls. Scallop pearls are not as common or as perfectly formed as oyster pearls, but along the Maine coast they occasionally occur in free-growing older scallops (usually five or six years of age) clustered around the adductor muscle. They are usually white and when cleaned have a beautiful shiny luster characteristic of pearls. Most are small, about the size of an apple seed, but occasionally I've found bigger ones.

Once when diving in Frenchman Bay, near an island called the Hop, I collected a particularly old scallop that contained a pearl the size of a small peanut. I was so enchanted by this gem from the ocean I had it set into a gold ring for my girlfriend.

In Maine, scallops have been fished by draggers since about 1880. Diving has several advantages over dragging. Drags are destructive to the bottom of the ocean. As a drag is pulled along, it digs furrows, scars the seafloor and kills or displaces other bottom-dwelling organisms. Dragging is also inefficient. Studies conducted by divers riding on a scallop drag have shown that many scallops simply swim out of the way as the noisy, cumbersome device goes clunking and tearing along the bottom. Because of this and because the ocean floor is rarely rock free and level, a scallop drag's efficiency is estimated at 5-15 percent.

A diver can selectively collect every scallop of harvestable size and leave the bottom of the ocean virtually unaltered. This ensures that younger scallops will repopulate the bed and other organisms are not disturbed. In the last ten years scallop diving has become Maine's newest fishery.

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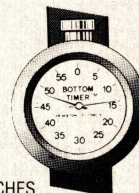
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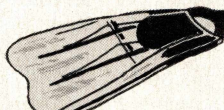
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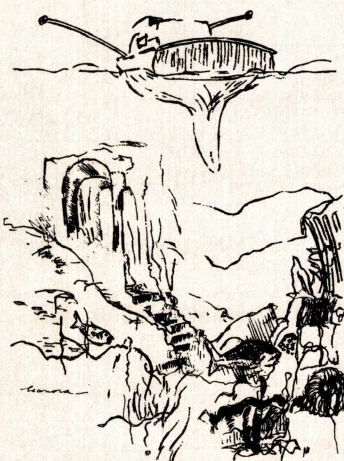


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SCALLOP DIVING

Divers have been able to work areas that are inaccessible to scallop draggers. Wherever there are known underwater obstructions, such as rock ledges or power cables, draggers will not lower their drags for fear of entanglement and the resultant loss of expensive equipment. But these are frequently the best areas for divers. They often contain virgin scallop beds. By scalloping these locations divers avoid potential conflicts with draggers working the same area.

Diving for scallops has developed only in the last ten years as scuba equipment and instruction became widely available. Today there are more than 100 commercial scallop divers working along the Maine coast from Penobscot Bay eastward to the Bay of Fundy. In this region, divers probably harvest over 3,000 pounds of scallops on each good weather day; this represents a \$16,000 to \$20,000 daily scallop diving fishery. If good scallop beds are found, a diver with a boat can potentially make \$1,000 per week and over the entire season enjoy a gross income of approximately \$20,000.

My early attempts at scalloping with Ben reflect what it's like for many people who first enter the fishery. Most start scallop diving with no previous fishing experience and their early attempts are often frustrating with dreams of making a lot of money quickly shattered.

Yielding the highest price per pound of any local seafood, scallops are the gold in Maine waters. Predictably, scallop diving has attracted a lot of fortune seekers. Elaine Eaton, one of the few women who scallop dives, says when a diver walks into her Harbor Divers Dive Shop, Mount Desert Island, for air she can tell quickly whether or not he'll make it. "You need self-motivation to scallop dive. It takes a special kind of person to climb out of bed at 5:00 am so he'll have enough time to chip the ice off his boat before diving."

Scallop diving may sound like a cold and dangerous activity and it most certainly is. Divers routinely contend with the ordeal of working underwater in temperatures between 30 and 40°F. Since seawater freezes at 29°F, scallop divers often swim in water the temperature of a freshwater ice cube. Prolonged exposure to these temperatures can result in hypothermia, frostbite and a slowing of mental processes. Scallop diving demands a high degree of stamina, several years of previous diving experience and an earnest and immediate vision of what it will be like when you finally get out of the water and warm up.

Along with the risks and extreme cold of scallop diving, there is also the high price of scallops and the sheer romance of diving. Together these have fueled and established scallop diving as a Maine fishery that is bound to grow as more

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people learn to dive. As it grows, what of the scallops, the leading characters in this story? I've talked to some of the older fishermen in Bar Harbor and they say scallops used to be so abundant that at low tide you could go to the water's edge and rake them off the bottom. Today, however, both divers and draggers are searching for them in deeper waters.

Even the scallop beds on Georges Bank are showing evidence of decline. The National Marine Fisheries Service (NMFS) in Woods Hole has been conducting scallop surveys on this offshore bank since 1975. Their findings indicate the populations are now one-fourth to one-third the size of the 1975-79 population. While similar studies have not been conducted along the Maine coast, these results warn us to proceed with caution and forethought in our exploitation of this ocean resource. Perhaps then our grandchildren will also be able to afford and enjoy the delight of Maine scallops.

In the meantime, I trust I'll have many more scallop dinners before my grandchildren come along. Nowadays I only dive once in awhile because I've become more interested in whale research and photojournalism. I still invite Ben over for a nostalgic scallop feed from time to time and maybe he'll be around to tell stories to my grandchildren about those early, cold mornings in Blue Hill Bay. 🐠

ISLAMORADA WRECK

A steel hulled barge was recently sunk by a local salvage company off Islamorada, FL in 115 feet of water. The barge had been donated by the Upper Keys Sailing Club to the Florida Keys Artificial Reef Committee.

Capt. Ken Wright, a member of the board of directors of the Artificial Reef Committee and owner of Lady Cyana Divers in Islamorada, donated the use of the *Lady Cyana* as a spectator and press boat and also pinpointed the intended wreck site for the salvage company. Capt. Joanie Follmer, also of Lady Cyana Divers, videotaped the sinking.

The barge now lies intact on the ocean bottom. It is becoming a fish haven. 🐠

BISCAYNE PARK TOURS

To provide access to the recreational resources of the Biscayne National Park, the National Park Service has authorized regular commercial passenger boat service to the islands and reefs in Biscayne Bay. Biscayne Aqua-Center, Inc., of Homestead, FL now offers passage aboard the 50 foot *Reef Rover III* for Elliott Key inland nature tours, reef snorkeling and diving excursions and sunset cruises. Advance reservations are required for the trips and custom itineraries can be designed for groups.

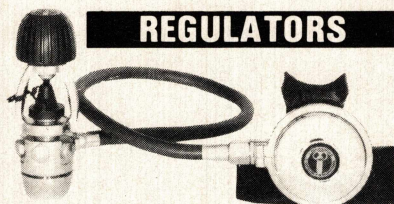
The Biscayne Aqua-Center office at park headquarters is a fully stocked dive store. 🐠

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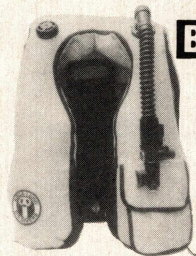
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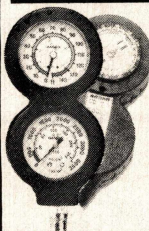
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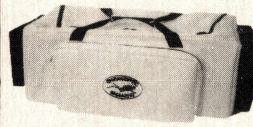
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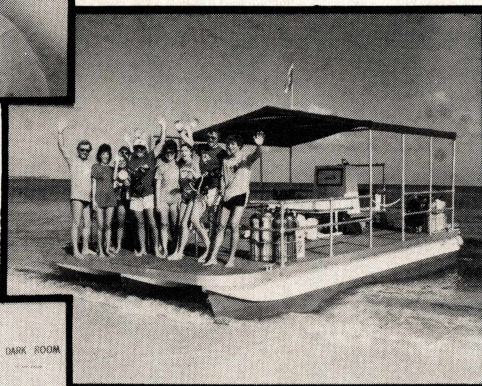
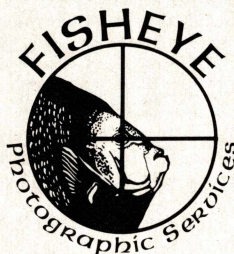


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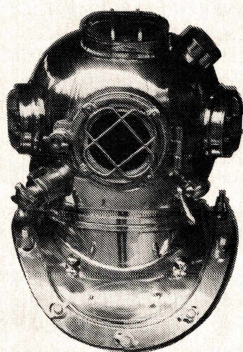
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FUJI 100

(Continued from Page 55)

Mark 100 strobe (which an assistant swam up to the surface and back for re-loads) Jim shot two rolls of Fujichrome 100; we mailed one roll to Fuji for processing and put the other through our own E-6 processing system. For comparison, Jim also shot a roll of Ektachrome 100 and a roll of Professional Ektachrome 64 which we processed.

The Fujichrome slides were sharp and bright. Compared to the Ektachromes, the Fujichrome 100 slides were brighter overall, especially in the red, green and

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*P.I. = Processing Included

yellow areas. This was especially true with the film processed by Fuji. While the Fujichrome 100 we processed was slightly brighter than the Ektachrome, the Fuji processing seemed to enhance color saturation. However, the Fujichrome slides had a slight greenish tint in the black areas, whereas the Ektachromes had neutral blacks. Keep in mind, however, that this tint was slight.

Our close-up test exposures were taken with a Nikonos Close-Up Kit and Nikonos cameras with 1:3 and 1:2 extension tubes. Yellow cup corals and sponges, blue tunicates, orange brittle-stars, red sponges and other colorful subjects were recorded bright and colorful on Fujichrome 100. While Fujichrome 50 may have a finer grain, the Fujichrome 100 close-ups were excellent.

Fuji states that no exposure or color balance reciprocity compensation is required if exposure times remain within a 1/4000 to 1 second range. Because strobes with automatic exposure controls may have extremely short flash durations, Fuji warns that such exposures may affect the color balance of the fin-

ished transparency. Therefore we used a Nikonos V and Nikon SB-102 Speedlight (strobe) with TTL (through the lens) automatic exposure control to check for the color balance in close-ups where the flash duration could be significantly shorter than 1/4000 second. We didn't detect any color problems, but we were photographing typical U/W close-up subjects, not studio color charts.

To sum it up, the Fujichrome 100 we tested was significantly sharper and had better colors than the Fujichrome 100 we tested three years ago. Fuji claims to have improved their films and our slides show that they have.

Fujichrome 100 is available in 20 and 36 exposure cassettes, with or without prepaid mailers. You can send Fuji color slide films to a Fuji lab or to any (non Kodak) lab that uses the Fuji CR-56 or E-6 process. If you process your own slides, you can also process Fujichrome with the Kodak standard or Hobby Pac chemicals. For more information, contact a professional photo shop or write directly to: Fuji Photo Film Co. Ltd., 350 Fifth Avenue, New York, NY 10001. 

SAN NICOLAS

(Continued from Page 60)

It may be in this state while digesting a meal. But when it is awaiting dinner it is most beautiful. Then the delicate tentacles are outstretched in the hope of snatching any unfortunate creature within reach. Being unable to pursue its prey has caused the anemone to have little preference for what it includes in its diet.

Inching slowly over the reefs you may come upon a small creature that resembles the ball from a stocking cap. While moving in for a closer look, the animal suddenly disappears, leaving nothing but a small hole. You've just experienced the very effective defense of the featherduster worm. The secret to observing and photographing this creature is to approach slowly, without exhaling bubbles.

Nudibranchs are also quite common in Dutch Harbor. I have personally counted as many as four different types during one dive. They are a favorite photographic subject because of their bold colors and graceful appearance. Some varieties common to San Nick are the horned nudibranch, sea lemon, Hilton's nudibranch and the Spanish shawl. They are normally found moving ever so slowly on the bottom. The Spanish shawl is especially beautiful with its purple body and bright orange cerata dancing like flames in the ocean current.

On rare occasions, divers find an animal that appears to be nothing short of a jewel—the purple ringed top shell. The spiral ridges of the shell are of a beaded texture which further enhances its gem-like appearance. Whatever may be one's pleasure in diving, it exists at San Nicolas Island. 

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NOGI AWARDS

BY JIM WALKER

The 1984 recipients of the Underwater Society of America's NOGI awards have been selected. Each year the society presents this prestigious award to four individuals who have distinguished themselves in the diving community. This year's notables include: Mendel Peterson/Arts, Helen Turcotte/Sports/Education, Otto E. Van Der Aue/Science and

Mendel Peterson/Arts



Elliott Finkle/Distinguished Service.

Mendel Peterson/Arts: Mendel Peterson has authored numerous articles on naval and military history and numismatics. He has collected and studied coins, both ancient and modern, for over 35 years. His explorations have included underwater sites in the Florida Straits, West Indies and Bermuda.

Peterson was one of the first museum professionals to dive on a shipwreck. In 1951 he joined a group which had located several wrecks in the Florida Keys. Edwin Link, inventor of the Link Trainer, was also a part of the group. Peterson, with the financial help of Link, went on to design devices for plotting underwater sites and devised techniques for the preservation and identification of objects recovered. Two of the plotting devices—the compass circle and measuring chain

(the Peterson Circle) and a multiple gauge for measuring ship timber, remain in use around the world today.

Until 1973 Peterson was director of the Underwater Exploration Project and curator of the Division of Historic Archaeology in the National Museum of History and Technology, Smithsonian Institution.

Retired from the Smithsonian in 1973, he has been a lecturer/consultant in underwater exploration. He was director of history and archaeology for the Northwest Energy Corporation in 1983.

Peterson's expertise in coins has helped him become one of the world's leaders in dating wrecks through study of

Helen Turcotte/Sports/Education



coins found on them. He is also an expert on dating cannons and anchors as well as other artifacts discovered on a wreck site. Peterson was instrumental in identifying the early wrecks explored by CEDAM of Mexico. He is the author of *History Under the Sea*, a handbook for underwater exploration.

Helen Turcotte/Sports/Education: The continuing growth of the scuba diving industry is based in large part on the public's accurate perception of the sport as safe. Helen Turcotte has played a sig-

nificant role in this awareness.

During the early 1970s, as she led scuba expeditions around the world, Turcotte recognized that physician/divers on her trips desired more knowledge of the medical aspects of sport diving. She also recognized it was important for divers to have physicians trained to diagnose and treat scuba emergencies. Acting on this knowledge, she organized Medical Seminars, Inc. and offered programs in diving medicine for physicians, conducted by specialists in the field.

As the planner for one week diving medicine seminars, Turcotte organizes a complex package of faculty, classroom facilities, air travel, hotel accommodations and diving for over 200 physicians each year. Medical Seminars, Inc. has gone further to expand this body of knowledge through its publishing division which offers the *Hyperbaric and Undersea Medicine* home study course and *Medical Examination of Sport Scuba Divers* to physicians and divers.

The result of Turcotte's decade of effort on behalf of scuba divers is that anyone in the U.S. suffering a diving injury can have a physician available that understands the disorder and is able to provide

Otto E. Van Der Aue/Science



expert, immediate care and referral to a treatment chamber, if necessary. Also, potential divers can find a physician trained to make realistic judgments on their fitness to dive. Turcotte's efforts have added immeasurably to the safety of our sport and thus contributed significantly to its growth and to the enjoyment of its practitioners.

Otto E. Van Der Aue/Science: The work of the late Captain Otto E. Van Der Aue (Medical Corps, USN, Retired) formed the basis of many later developments in diving theory and practice. He formulated the first oxygen treatment tables and devised a method to evaluate the effectiveness of any such table. He conducted the first air saturation chamber dives and pioneered heliox work dives in the open sea to depths below 500 feet. He was the first to use a pneumofathometer, which he invented. He did research in decompression sickness and designed and tested surface decompression tables with air and oxygen.

Dr. Van Der Aue's experiments led the way to both Workman's M-value concepts (dealing with inert gas tension in tissues) and to other concepts in saturation diving. He envisioned and initiated hyperoxygenation as a treatment for decompression sickness and, with limited assets and support, was able to blend detailed studies in animals with the theory and practice of decompression in man.

Van Der Aue was commanding officer of the Naval Medical Research Institute, and, as head of the Submarine Division, Navy Bureau of Medicine and Surgery, he encouraged many Navy physicians to become submarine medical officers.

Van Der Aue has been described as the kind of solid, thorough, meticulous investigator whose findings and conclusions need not be questioned by those who desire to build upon them. His efforts set the foundation on which much of current diving medical knowledge, and thus safety, rests.

Elliott Finkle/Distinguished Service: Elliott Finkle has been responsible, directly or indirectly, for the promotion, funding and administrative direction of a broad range of NOAA (National Oceanic and Atmospheric Administration) sponsored Man-in-the-Sea projects since 1971. Since that time he has served as operations director, deputy director and director of the National Undersea Program's Manned Undersea Science and Technology (MUST) Program—now called NOAA's Undersea Research Program (NURP).

Finkle has been responsible for generating the the funding and providing the di-

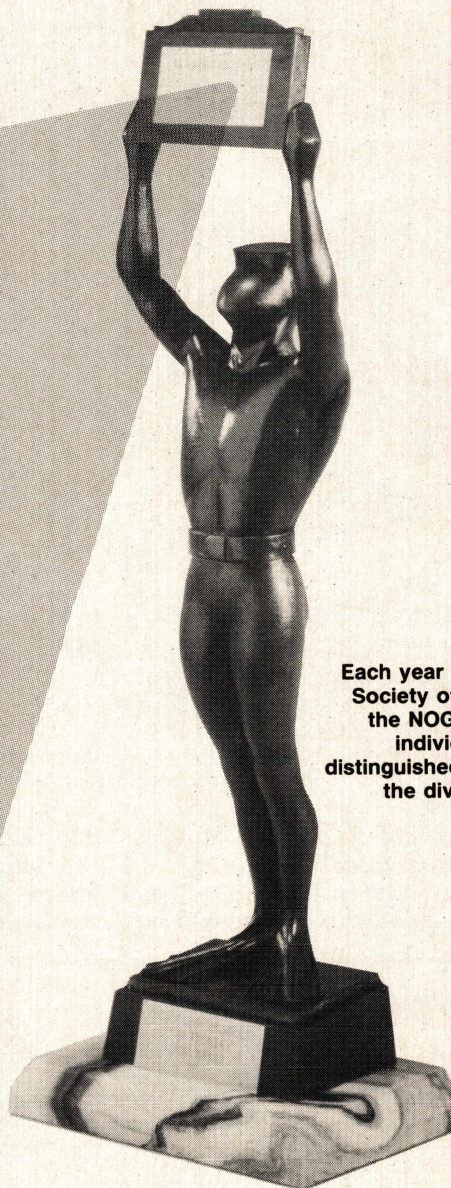
rection of many major habitat/saturation programs. In these activities over 300,000 hours of bottom time have been logged in a saturation mode in support of undersea research. He has also been responsible for 60 manned submersible programs logging over 900 dives. Over 50 biomedical programs have been provided with funding and guidance by him.

Finkle's work directly affects sport and commercial divers in that the MUST-NURP worked closely with the U.S. Navy to develop decompression gauges, portable recompression chambers, protocol for field evaluation of commercial divers using saturation procedures and physical

examination criteria for deep sea divers. These programs also sponsored numerous workshops on oxygen toxicity, nitrogen narcosis, rehabilitation of a paralyzed diver, accident management training and a Doppler device for detecting bubbles in the blood stream.

Finkle's most recent service to the diving community has been the establishment of a National Undersea Research Program with operations in Hawaii, California, North Carolina, Connecticut and St. Croix. »

Inquiries about the NOGI awards should be addressed to: NOGI USA, 4545 Holmes, Kansas City, MO 64100.



Each year the Underwater Society of America gives the NOGI award to four individuals who have distinguished themselves in the diving community.

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 BY BONNIE J. CARDONE

You had triple bypass surgery several months ago. It wasn't easy, but you finally feel good again and can't wait to get back into diving. Your physician—a non diver—is horrified when you mention this to him. He tells you your diving days should be over. How can you find out if his opinion is valid? Call DAN.

You go beach diving with your buddy. Since you are a careful diver you have noted the location of the nearest phone. After the dive your buddy begins complaining about a tingling in his elbow. Then he tells you he may have been too deep, too long. You need to know where to get help and what to do for your friend now. What do you do? Call DAN.

There has long been a need for an agency that could dispense both emer-



gency and non-emergency medical information for divers as well as keep track of the locations of recompression chambers (these change constantly). DAN—Divers Alert Network—is such an organization. For non-urgent dive medical questions you or your physician can call (919) 684-2948 Monday through Friday from 9:00 am to 5:00 pm (Eastern Standard Time). In an emergency the number to call is (919) 684-8111. This number is staffed 24 hours a day and will accept collect calls if necessary.

DAN began life in 1980 as a federally funded organization. The grant money was decreased to 50 percent in 1982; to 25 percent in 1983. There were no federal funds allocated for DAN this year or in the future. DAN is now supported solely by contributions from divers. There were 7,300 individual, 28 corporate, 15 club and 4 dive store members as of last September. Individual memberships are \$10;

corporate memberships, \$250; store memberships, \$100; and club memberships vary according to the number of people involved.

What do you get for your donation? Most importantly, there is the peace of mind that comes from knowing help is just a phone call away in a dive emergency and that the latest dive medical information is available to you or your physician, also with just a phone call. With your DAN membership card comes a packet of materials including: the *DAN U/W Diving Accident Manual*, several scuba tank decals and a subscription to the Alert Diver. This latter is published six times each year and contains short articles on diving medicine and safety. Case histories (names are omitted) of dive accidents are discussed and there is a question and answer column. The *Diving Accident Manual* describes first aid for dive related injuries and provides guidelines for treating them.

The people at DAN are also looking to the future. They are compiling a list of diving physicians so they can make referrals to divers who call in with dive medical problems. (Physicians who are divers should let Chris Wachholz at DAN know who and where you are and what your specialty is.) Also, DAN would like to work with companies to bring good dive related products to the public. In the October issue of *SDM* there was an article on Midwest Life Support Systems' first aid kit, developed in conjunction with DAN. The sale of these kits provides money for DAN. Other possible DAN approved products include oxygen equipment and medical insurance.

Aside from becoming a DAN member every year, there are various ways to earn money for DAN. The owners of one charter dive boat company organized Caribbean trips and donated part of the proceeds to DAN. Clubs have organized treasure hunts and other events with all or part of the monies raised going to DAN. The DAN staff has published a pamphlet that will tell you how to do this step by step. DAN also sells bumper stickers, patches, baseball caps and T-shirts with the DAN logo and phone number on them. Dive stores and clubs can buy a number of these and sell them—DAN makes money with every purchase.

The important thing to remember is that DAN cannot exist without funds and these funds must come from the dive community. How important is DAN? Well, in 1983 the agency received 1,600 phone calls, about 320 of which were dive emergencies. The total number of phone calls was double that received in 1982. Is having an organization such as DAN worth \$10 a year? It is to me—I'm a DAN member. Are you?

For more information or a membership application see the ad in this issue of *SKIN DIVER* or write: DAN, Box 3823, Duke University Medical Center, Durham, NC 27710.



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- **TANK DECALS** with the DAN emergency phone number.
- The **DAN UNDERWATER DIVING ACCIDENT MANUAL** which describes symptoms and first aid for the major diving related injuries plus guidelines a physician can follow for drugs and i.v. fluid administration.
- A **NEWSLETTER, "ALERT DIVER"**, presents information on diving medicine and diving safety. Actual DAN case histories and questions are presented in each issue.

- ☐ Yes, I wish to join the National Divers Alert Network (DAN), and enclose my membership fee of \$10. Please send my new member's package as soon as is possible. (Please allow 3-6 weeks for delivery.)

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AGENCY _____

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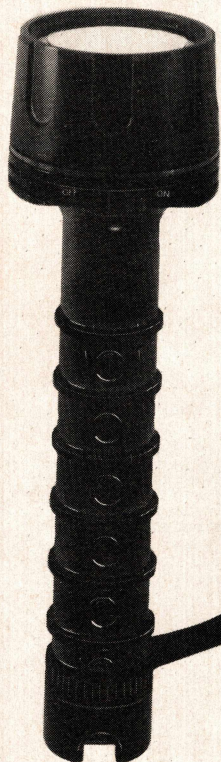
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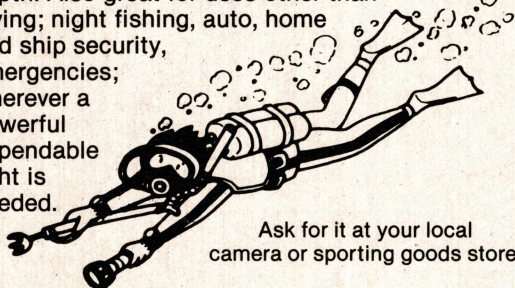
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ZODIAC MARK IV

(Continued from Page 49)

was required to keep it there. As a matter of fact, we kept it throttled back through most of the run because there was a lot of uncomfortable bounce going uphill in the short interval wind chop. That type of sea condition is the toughest for any inflatable boat and the Mark IV was not immune to its effects. However, the passengers remained dry, probably owing to a combination of the wide diameter tubes and the tunnel effect of the hull.

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2. Mail subscription.....	165,122	172,756
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D. Free distribution by mail, carrier or other means: Samples, complimentary, and other free copies.....	6,218	5,282
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Nigel P. Heaton
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SDM INDEX 1984

COMMERCIAL DIVING

COLLEGE OF OCEANEERING, pg. 64, Jan.
DIT DEEP DIVE BARGE by A.F. Star, pg. 74, Mar.
JIM AND WASP TRAINING by Christopher Swann, pg. 58, July
DIVERS INSTITUTE OF TECHNOLOGY by E.R. Cross, pg. 42, Aug.
DIVERS ACADEMY OF THE EASTERN SEABOARD by Cathie Cush, pg. 117, Nov.

CONSERVATION

THE GREAT ABALONE PLANT by Hillary Hauser, pg. 108, Feb.
ARTIFICIAL REEFS by Heyward Mathews, pg. 136, Feb.
ABALONE FARM by Hillary Hauser, pg. 112, Nov.

DIVE BOATS

SPORTSCO SEA SCIP by Steve Lucas, pg. 46, Feb.
AMERICAN RADHIAL 630 INFLATABLE by Eric Hanauer, pg. 126, Feb.
NOVURANIA'S CANGURO 450 GS INFLATABLE by Eric Hanauer, pg. 78, Mar.
ACHILLES SE 12 INFLATABLE by Eric Hanauer, pg. 54, Apr.
MOTOMAR 480R INFLATABLE by Eric Hanauer, pg. 68, May
AVON S 4.00 INFLATABLE by Eric Hanauer, pg. 129, June
SEA EAGLE GT-45 by Eric Hanauer, pg. 49, Aug.
AMERICAN RADHIAL 500 RIB INFLATABLE by Eric Hanauer, pg. 109, Oct.
ZODIAC MARK IV by Eric Hanauer, pg. 47, Dec.

DIVE EQUIPMENT

VIKING SPORT 80X DRYSUIT by Jim Walker, pg. 53, Jan.
TEKNA DIGITAL DIVE TIMER by Geri Murphy, pg. 54, Jan.
DIVETRONIC INSTRUMENTS, pg. 59, Jan.
MARES POWER PLANA GRAPHITE by Eric Hanauer, pg. 28, Feb.
DUI SELF-DONNING DRYSUIT by Jim Walker, pg. 33, Feb.
INDEX OF DIVING EQUIPMENT MANUFACTURERS by Geri Murphy, pg. 49, Feb.
HENDERSON'S FREEDOM WETSUITS by Bonnie J. Cardone, pg. 64, Feb.
SEAQUEST SEA JACKET V by Jim Walker, pg. 80, Mar.
SEAQUEST INSTRUMENT CONSOLE by Jim Walker, pg. 56, Apr.
DIVING SYSTEMS INTERNATIONAL by Hillary Hauser, pg. 110, Apr.
D.I.V.E. BUBBLES by Bonnie J. Cardone, pg. 114, Apr.
MARKER AND RETRIEVAL BUOY SYSTEM by William R. Carter, Jr., pg. 124, Apr.
FORCE FIN PRO by Eric Hanauer, pg. 65, May
U.S. DIVERS SEA LION BC by Bonnie J. Cardone, pg. 71, May
HEUER'S DIVE TIMER WATCH by Geri Murphy, pg. 72, May
MARES PRIMA MASK by Jim Walker, pg. 141, May
U.D.T. BUDDY BAG by Geri Murphy, pg. 143, May
THE WHALE BAG by Geri Murphy, pg. 22, June
SEAQUEST'S POSITIVE RELEASE WEIGHTBELT by Jim Walker, pg. 38, June
TOSHIBA K-133 U/W LIGHT by Bonnie J. Cardone, pg. 47, June
HENDERSON'S RED CORAL WETSUIT by Bonnie J. Cardone, pg. 49, June
PARKWAY'S OCEAN JACKET by Marty Snyderman, pg. 54, June
AQUA-LUNG PRO LINE COMPRO FIN by Marty Snyderman, pg. 56, June
MORAY INDUSTRIES, pg. 122, June
WENOKA UDT KNIFE by Peter Plik, pg. 30, July
TEKNA MASK/SNORKEL by Geri Murphy, pg. 49, July
AMF MARES by Paul Tzimoulis, pg. 52, July
THE MINI PONY by Geri Murphy, pg. 54, July
PARKWAY PLUSH WETSUIT by Jim Walker, pg. 56, July
DACOR TURBO VENT II SNORKEL by Bonnie J. Cardone, pg. 129, July
NU-WAY MINI COURSE ON REPETITIVE DIVE TABLES by Jim Walker, pg. 38, Aug.
JM COUSTEAU SIGNATURE WETSUIT by Jim Walker, pg. 55, Aug.
PARKWAY SUBMERSIBLE PRESSURE GAUGE by Bonnie J. Cardone, pg. 56, Aug.
TABATA TOTAL DIVING SYSTEM by Eric Hanauer, pg. 114, Aug.
U.S. DIVERS PRO KNIVES III AND IV by Marty Snyderman, pg. 49, Sept.
MARES TRAVEL POLESPEAR by Eric Hanauer, pg. 53, Sept.
IKELITE PRO-S COMPASS by George Cozens, pg. 54, Sept.
HARVEY'S AQUA CAPSULE II DRYSUIT by Fred Fischer, pg. 55, Sept.
DIVE-MED FIRST AID KIT by Bonnie J. Cardone, pg. 56, Sept.
TABATA TUSA DIVE FIN by Jim Walker, pg. 115, Sept.
SEATEC THERMOTEC DRYSUIT by George Cozens, pg. 57, Oct.
SCUBA TRAK UNDERWATER LOCATOR by Eric Hanauer, pg. 60, Oct.
RANGER I WETSUIT by Marty Snyderman, pg. 62, Oct.
OCEANIC SNORKEL by Jim Walker, pg. 63, Oct.
AQUA-LUNG OCEAN LIGHT by Bonnie J. Cardone, pg. 64, Oct.
AQUA-LUNG COMPRO GRAPHITE FIN by Eric Hanauer, pg. 53, Nov.
BLUEWATER EXPLORER WETSUIT by Bonnie J. Cardone, pg. 56, Nov.
OCEANIC DATAMAX by Jim Walker, pg. 58, Nov.
CHRONOSPORT'S UDT/MARK II by Jim Walker, pg. 60, Nov.
STEP-ON DIVE PLATFORM by Eric Hanauer, pg. 119, Nov.
AQUACRAFT II by Eric Hanauer, pg. 28, Dec.
OCEAN WATCH FROM PORSCHE DESIGN by Jim Walker, pg. 41, Dec.
COBRA WETSUITS by Marty Snyderman, pg. 46, Dec.
IMPERIAL'S SUPERLIGHT DRYSUIT by Bonnie J. Cardone, pg. 48, Dec.

EDITORIALS by the Publisher
SMOKING: OXYGEN STARVATION FROM WITHIN, pg. 4, Jan.
INACTIVITY: THE DIVER'S WORST ENEMY, pg. 4, Feb.
DIVE DEFENSIVELY, pg. 4, Mar.
SEVEN DEADLY SINS, pg. 4, Apr.
DIVE TRAVEL IN AMERICA, pg. 4, May
WHAT MAKES A GOOD DIVER?, pg. 4, June
A FEDERAL SCUBA TAX?, pg. 4, July
WHEN GOOD DIVERS DO DUMB THINGS, pg. 4, Aug.
PLANNING A DIVE VACATION, pg. 4, Sept.
THE DIVER'S MOST DEADLY DISEASE, pg. 4, Oct.
SCUBA FITNESS YEAR-ROUND, pg. 4, Nov.
HOT TANKS=TROUBLE, pg. 4, Dec.

FISH OF THE MONTH
THE FIRE GOBY Hauser/Newbert, pg. 100, Apr.
THE SWEETLIPS Hauser/Newbert, pg. 58, June
THE BLUE ANGELFISH Hauser/Frink, pg. 46, Sept.
THE RHINO MORAY Hauser/Roessler, pg. 72, Nov.
THE LEMON BUTTERFLYFISH Hauser/Roessler, pg. 56, Dec.

FOREIGN TRAVEL
SCUBABOWL III by Peter M. Casley, pg. 86, Jan.
UNITED STATES VIRGIN ISLANDS by Jim and Cathy Church, pg. 69, Jan.
BIMINI by Steve Lucas, pg. 96, Jan.
SOUTH COVE by Barbara Currie, pg. 100, Jan.

THE CAYMAN ISLANDS by Geri Murphy, pg. 65, Feb.
BONAIRE CLIFF DIVING by Bruce Bowker, pg. 103, Feb.
THE GALAPAGOS by Carl Roessler, pg. 95, Mar.
CAYMAN GUARANTEED by Carol Winker, pg. 102, Mar.
SEA OF CORTEZ SEAFARI by Bonnie J. Cardone, pg. 106, Mar.
BAHAMAS DIVE GUIDE by Geri Murphy, pg. 57, Apr.
THE CAYMAN ISLANDER by Carol Winker, pg. 83, Apr.
FISHEYE PHOTOGRAPHIC by Steve Lucas, pg. 92, Apr.
TROPIC BIRD by Stephen Frink, pg. 75, May
CORAL SEA by Carl Roessler, pg. 83, May
DON FOSTER'S/ROYAL PALMS by Barbara Currie, pg. 92, May
DIVE TRAVEL HINTS by Bruce Bowker, pg. 94, May
PAPUA NEW GUINEA by Marty Snyderman, pg. 100, May
LONDON HOUSE by Barbara Currie, pg. 110, May
BERMUDA by Geri Murphy, pg. 115, May
ANTHONY'S KEY RESORT by Stephen Frink, pg. 73, June
DIVING DOCTORS DOWN UNDER by Barbara Currie, pg. 80, June
THE LAMMER LAW by Nancy Ferguson, pg. 88, June
THE FANTASEA by Steve Lucas, pg. 90, June
BOB SOTO'S SCUBA CENTRE by Geri Murphy, pg. 96, June
TURKS AND CAICOS by Carl Roessler, pg. 87, July
CAYMAN'S CALYPSO DIVERS by Barbara Currie, pg. 88, July
CORAL SEA by Mark H. Dorfman, pg. 96, July
CHINCHORRO BANKS by Steve Lucas, pg. 104, July
CAP'N DON'S HABITAT by Ellsworth Boyd, pg. 67, Aug.
MICRONESIA'S SUPER CRUISER by Carl Roessler, pg. 72, Aug.
SAIL BELIZE by Stephen Frink, pg. 74, Aug.
THE KIPP CONNECTION by Geri Murphy, pg. 76, Aug.
BVI DIVE GUIDE by Jim and Cathy Church, pg. 59, Sept.
SPANISH COVE by Barbara Currie, pg. 69, Sept.
CHRISTMAS ISLAND by Ward Graessle, pg. 80, Sept.
PROVO'S THIRD TURTLE INN by Steve Lucas, pg. 65, Oct.
FLAMINGO BEACH FANTASY by Barbara Currie, pg. 70, Oct.
ANSE CHASTANET by Stephen Frink, pg. 82, Oct.
BONAIRE DIVE GUIDE by Geri Murphy, pg. 35, Nov.
ST. CROIX'S BUCCANEER HOTEL by Stephen Frink, pg. 69, Nov.
SPANISH WELLS by Paul Tzimoulis, pg. 76, Nov.
CLASSROOM OF CORAL by Jeffrey H. Marcus, Ph.D., pg. 69, Dec.
UNDERWATER EXPLORERS SOCIETY by Stephen Frink, pg. 76, Dec.
SCAPA FLOW by Bob Michelson, pg. 92, Dec.

LOCAL DIVING
MARATHON'S MAGIC by Steve Lucas, pg. 93, Jan.
DIVE GUIDE TO HAWAII by Jim and Cathy Church, pg. 31, Mar.
FROZEN WORLD by David C. Haas, pg. 60, Mar.
FLORIDA'S PALM BEACH AREA by Steve Lucas, pg. 81, Mar.
CALIFORNIA'S TANNER AND CORTES BANKS by Steve Smith, pg. 44, Apr.
BULL SHOALS LAKE by Barry McKenzie and Linda Masters, pg. 112, Apr.
FLORIDA'S GOLD COAST by Steve Lucas, pg. 49, May
OCEAN DIVERS by J. Russel Slack, pg. 108, May
MONTEREY COAST by Darren Douglass, pg. 134, May
NEW YORK/NEW JERSEY DIVE GUIDE by Joe Bereswill and Al Boehm, pg. 61, June
MISSOURI RIVER DRIFT DIVE by Deann DeKay Hilmo, pg. 94, June
LA JOLLA SUBMARINE CANYON by Marty Snyderman, pg. 40, July
SDM DIVE GUIDE TO THE FLORIDA KEYS by Stephen Frink, pg. 61, July
GHOST TOWN QUARRY by Mark H. Dorfman, pg. 108, July
MONTEREY BREAKWATER by Steve Rosenberg, pg. 110, July
DIVING THE OREGON COAST by Karl Anderson, pg. 46, Aug.
SANTA BARBARA DIVE GUIDE by Marty Snyderman, pg. 57, Aug.
PORT LARGO RESORT by Stephen Frink, pg. 78, Aug.
FT. LAUDERDALE WRECKS by Mark M. Lawrence, pg. 82, Aug.
FLORIDA'S UNDERWATER BRIDGE by Kevin Wadlow, pg. 92, Aug.
BEE ROCK by Jim Cooluris, pg. 14, Sept.
DIVERS UNLIMITED by Steve Lucas, pg. 72, Sept.
DIVING WESTERN NEW YORK by Sven Stau, pg. 100, Sept.
NEW ENGLAND SHORE DIVING by David F. Donavel, pg. 28, Oct.
DIVING DESTIN, FLORIDA by Lynne L. Hall, pg. 74, Oct.
PENNEKAMP PARK by Stephen Frink, pg. 76, Oct.
DIVERS CLEAN CATALINA WATERS by Rusty Geller, pg. 86, Oct.
MIAMI DIVE GUIDE by Steve Lucas, pg. 61, Nov.
CATALINA'S U/W PARK by Michael W. Steidley, pg. 71, Nov.
SAN NICOLAS ISLAND by Rob Fazio, pg. 58, Dec.
FLORIDA SPRINGS DIVE GUIDE by Steve Lucas, pg. 61, Dec.
CHIPOLA RIVER by Alan Williams, pg. 88, Dec.

MARINE LIFE
DRAGON OF THE DEEP by Geri Murphy, pg. 22, Jan.
CALIFORNIA'S SUBMARINE GARDENER by Gary L. Wilson, pg. 117, Mar.
GAMES SEA LIONS PLAY by Eric Norris, pg. 120, Apr.
HOW DIVERS CAN AID SCIENCE by Donna Marie Vaughan, pg. 86, June
BASIC GUIDE FOR CREATURE SEEKERS by Donna and Chris McLaughlin, pg. 124, June
THE LAVENDER LOBSTER by Helmut Debelius, pg. 18, Sept.
THE SIXGILL SHARK by Jeff Mariave, pg. 40, Sept.
FRESHWATER JELLYFISH by Steve Kennedy, pg. 26, Oct.
THE RED ABALONE by Steve Rosenberg, pg. 32, Oct.
KING OF THE HILL by Bonnie J. Cardone, pg. 58, Oct.
SDM'S BOOK OF FISHES by Bonnie J. Cardone, pg. 74, Nov.
ICE DIVING FOR SCALLOPS by Gregory S. Stone, pg. 50, Dec.
DANGER IN PARADISE by Alex Kerstitch, pg. 52, Dec.
OLIVER'S TWIST by Dee Scarr, pg. 74, Dec.
MUSSELS FROM THE OFFSHORE by Hillary Hauser, pg. 83, Dec.

MISCELLANEOUS
PROFESSIONAL ASSOCIATION OF DIVING INSTRUCTORS by Jim Walker, pg. 56, Jan.
PROPER MASK CLEARING by Jerry Schnabel, pg. 122, Jan.
SDM ANNUAL CALENDAR OF EVENTS by Bonnie J. Cardone, pg. 77, Mar.
OVER 100 YEARS OF THE BENDS by Pam Golden, pg. 118, Mar.
NOGI AWARDS by Jim Walker, pg. 52, Apr.
UNDERWATER WEDDING by Jim Cooluris, pg. 106, May
LURE DIVING by John Van Niel, pg. 138, May
DANGEROUS DUDLEY DOES CAYMAN by Stan Waterman, pg. 84, June
GEMS FROM THE DEEP by Richard Triebe, pg. 60, July

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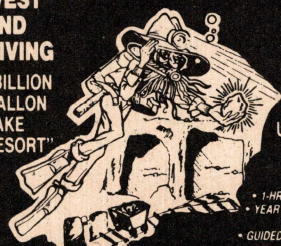
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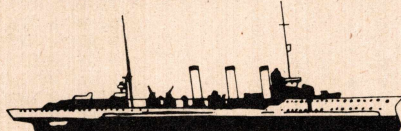
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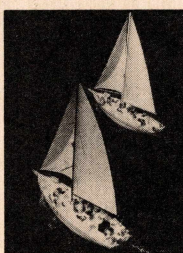
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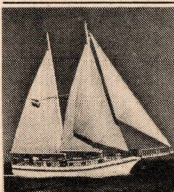
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SDM INDEX

DIVERS FLAG SAVED by Ellsworth Boyd, pg. 30, Sept.
NAUI by Peggy Abrahams, pg. 50, Oct.
AVOID DECOMPRESSION STOPS by Richard B. Streid, pg. 90, Oct.
PADI INTERNATIONAL COLLEGE by Dan Walsh, pg. 16, Nov.
NUMA by Steve Nagiewicz, pg. 20, Nov.
SEASON'S GREETINGS by Linda L. Rosendorf, pg. 34, Dec.
DAN NEEDS YOUR SUPPORT by Bonnie J. Cardone, pg. 110, Dec.

PERSONALITIES

CHARLES JEHL, pg. 132, Feb.
THE BUSINESS OF FISHES by Hillary Hauser, pg. 76, Mar. (Dr. John E. Randall)
TELL ERHARDT by Ellsworth Boyd, pg. 88, Apr.
DOCTORS WHO WORK UNDER THE SEA by Hillary Hauser, pg. 36, Aug.
LOUIS PREZELIN by Hillary Hauser, pg. 37, Dec.
1984 NOGI AWARDS by Jim Walker, pg. 108, Dec.

PHOTOGRAPHY

USA PHOTO CONTEST WINNERS by Paula M. Novotny, pg. 28, Jan.
REFLECTIONS by Jim and Cathy Church, pg. 118, Feb.
HOW TO START A PHOTO CLUB by Alan Williams, pg. 120, Feb.
KODAK'S HOBBY-PACS by Jim and Cathy Church, pg. 27, Apr.
NEW NIKONOS V CAMERA by Geri Murphy, pg. 30, May
JOURNEY THROUGH SEA SPACE by Dickie Walls and Phyllis Cathey, pg. 40, May
PHOTO CONTEST TIPS by Jim and Cathy Church, pg. 45, May
INLAND CLOSE-UPS by Harley J. Seeley, pg. 96, May
AUTOMATIC STROBES by Jim and Cathy Church, pg. 36, June
TUSSEY'S PRO-LINE HOUSING by Geri Murphy, pg. 44, June
PROFESSIONAL KODACHROMES by Jim and Cathy Church, pg. 32, July
CLOSE-UP-WIDE OPTICAL GROUP by Geri Murphy, pg. 37, July
PADI PHOTO SEARCH by Jeff Mondle, pg. 24, Aug.
POLAROID'S INSTANT SLIDES by Jack Schutt and Lynn Funkhouser, pg. 32, Aug.
WRECK PHOTOGRAPHY by Jim and Cathy Church, pg. 52, Aug.
EWA MASTER HOUSING by Stephen Frink, pg. 16, Sept.
FISHEYE PHOTO CONTEST WINNERS by Steve Lucas, pg. 22, Sept.
SUCCESSFUL UNDERWATER VIDEO by Jerry Schnabel, pg. 50, Sept.
HALLOWEEN UNDERWATER by Geri Murphy, pg. 16, Oct.
USA PHOTO CONTEST WINNERS by Paul M. Novotny, pg. 20, Oct.
FUJICHROME RF50 by Jim and Cathy Church, pg. 30, Oct.
WATERTIGHT PHOTO PARTS KIT by Rod Canham, pg. 106, Oct.
3M'S NEW COLOR SLIDE 1000 FILM by Jim and Cathy Church, pg. 24, Nov.
HELIUM AUTO-MARINE HOUSING by Stephen Frink, pg. 57, Nov.
OCEANIC'S DIGITAL 3000 STROBE by Geri Murphy, pg. 42, Dec.
FUJI 100 COLOR SLIDE FILM by Jim and Cathy Church, pg. 54, Dec.

REGULATORS by George Cozens

POSEIDON CYKLON MAXIMUM II, pg. 62, Jan.
SCUBAPRO MARK VII, pg. 54, Feb.
BARAKUDA'S BARAMAT 2002, pg. 66, Mar.
SHERWOOD BRUT, pg. 50, Apr.
NEW CRESSI-SUB POLARIS IV, pg. 66, May
DACOR AERO 350A, pg. 50, June
U.S. DIVERS CONSHLIF 30, pg. 50, July
SCUBAPRO'S MARK X, pg. 50, Aug.
SCUBAPRO'S A.I.R. II, pg. 54, Nov.

SCUBA QUIZ by Dennis Graver

DIVING SAFETY, pg. 11, Jan.
DRUGS AND DIVING, pg. 11, Feb.
BOAT ANCHORING, pg. 11, Mar.
DIVE TABLES UPDATE, pg. 11, Apr.
EQUIPMENT INSPECTION, pg. 11, May
CIRCULATION, pg. 11, June
EAR CLEARING TECHNIQUES, pg. 11, July
KNOTS, pg. 11, Aug.
BREATHING PATTERNS, pg. 11, Sept.
DIVE TRAVEL, pg. 11, Oct.
BUDDY DIVING, pg. 11, Nov.
SCUBA TANKS, pg. 11, Dec.
SPEARGUNS by Fred Fischer
CAVALERO CANON COMPACT 57, pg. 68, Jan.
CRESSI-SUB MACH 0.9, pg. 38, Feb.
AQUACRAFT'S BAJA BANDITO, pg. 65, Mar.
MARES SNUB NOSE, pg. 49, Apr.
SCUBAPRO 26 INCH PANTHER, pg. 70, May
ABBILLER 36 SPECIAL, pg. 55, June
MARES/SEAQUEST EXPLORER 22, pg. 54, Aug.
DACOR'S LE47 STINGRAY, pg. 60, Oct.
CRESSI-SUB SL100R by Fred Fischer, pg. 45, Dec.

TREASURE DIVING

TREASURE DIVING by Jim Cooluris, pg. 68, Mar.
CLEANING AND RESTORING TREASURE COINS by Art Edelstein, pg. 32, June
KEENE 2002 PORTABLE GOLD DREDGE by Jim Walker, pg. 52, June
RACE TO THE REPUBLIC by Ellsworth Boyd, pg. 18, July

WRECK DIVING

SPORT DIVERS VS. ARCHAEOLOGISTS by Howard B. Tower, Jr., pg. 108, Jan.
QUEEN OF THE LAKES by Richard Tiebe, pg. 106, Feb.
THE W.P. THEW by Stan Stock, pg. 116, Mar.
SALVAGING THE BOSTON by Howard B. Tower, Jr., pg. 98, Apr.
NEW JERSEY'S LANA CAROL by Herb Segars, pg. 130, Apr.
THE WATER WITCH by Derek K. Groat, pg. 132, Apr.
THE OLYMPIC II by Bonnie J. Cardone and Steve Giles, pg. 104, June
SALVAGING A CANNON by Sam Marci, pg. 114, July
THE S.37 by STEVE GILES, pg. 28, Sept.
SAGA OF THE MADISON by Scot Smith, pg. 57, Sept.
NEW JERSEY WRECKS by John Scala, Jr., pg. 86, Sept.
THE BAYRONTON by J.E. Reilly, pg. 110, Sept.
THE USS GREGORY by Steve Giles and Bonnie J. Cardone, pg. 112, Sept.
USS MONITOR by John Stringer, pg. 44, Oct.
USS JOHN C. BUTLER by Steve Giles, pg. 88, Oct.
USS MONITOR by John Stringer, pg. 44, Oct.
LAKE MICHIGAN WRECKS by Bill Steinborn, pg. 98, Oct.
WRECK OF THE SUPERIOR by Betty Tomas, pg. 102, Oct.
USS SAN DIEGO by Gary Gentile, pg. 90, Nov.
SS AVALON by Steve Giles, pg. 110, Nov.
WRECK OF THE MIZTEC by Kenneth E. Johnson, pg. 44, Dec.

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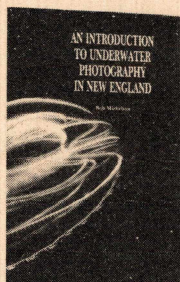
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Sea Stalking—By Carlos Eyles, this book explores free diving as a means to view the ocean in a way less alarming to the sea creatures than scuba. Such subjects as ocean acclimation and equipment are covered. \$5.95. Carlos Eyles, 249 Chiquita St., Laguna Beach, Calif. 92651.



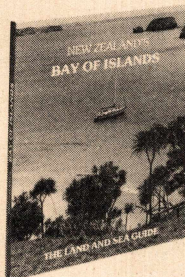
The California Coastal Access Guide—This new, expanded edition is prepared by the California Coastal Commission and published by the Univ. of Calif. Press, Berkeley, CA 94720. Maps, tide charts, black and white photos, facility/environment listings and species info. \$7.95.



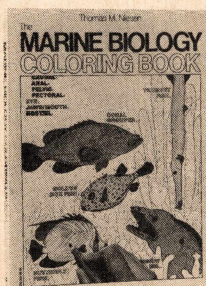
An Introduction to Underwater Photography in New England—By Bob Michelson this little book covers the subject from f stops to equipment maintenance. The book includes color photos of the marine species of the New England area. \$6.95. P.O. Box 781, Randolph, MA 02368.



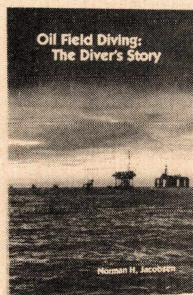
The Marine Aquarium Handbook: Beginner to Breeder—Written by Martin A. Moe Jr., this book presents information necessary to develop a successful marine aquarium. Construction, filtration, maintenance, fish selection. \$9.95. Norns Pub., P.O. Box 1172, Marathon, FL 33050.



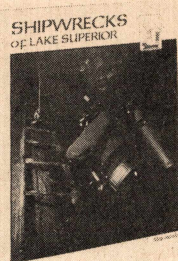
New Zealand's Bay of Islands—By Claire Jones, this guide covers the on shore sights and activities, information for boaters, and where to dive. Many photos and maps. \$15.95 plus postage. Rainbow Adventure Holidays, 23241 Ventura Blvd., Suite 216, Woodland Hills, CA 91364.



Marine Biology Coloring Book—By Thomas M. Niesen with illustrations by Wynn Kapit and Lauren Hanson. This book features coloring plates with texts, illustrating the marine environments and organisms. \$8.95. Coloring Concepts, Inc., P.O. Box 324, Oakville, CA 94562.



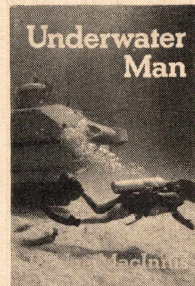
Oil Field Diving: The Diver's Story—By Norman H. Jacobsen, this book is his account of an actual 12 day dive operation on an offshore oil rig. Black and white, photos and illustrations. \$9.95 plus \$1.95 postage and handling. Jacobsen Properties, P.O. Box 96, Westwego, LA 70094



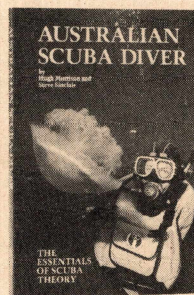
Shipwrecks of Lake Superior—This work by Jerry Eliason includes many photos of Lake Superior vessels both above and U/ W. A map shows the location of each wreck. \$3.95. Lake Superior Port Cities Inc., Suite 510, Meierhoff Bldg., 325 Lake Ave. South, Duluth, MN 55802.



Rainbowfishes of Australia and Papua New Guinea—By Dr. G.R. Allen and Norbert J. Cross, this book covers aspects of rainbowfishes including keeping them in an aquarium, their zoogeography and their classification. \$16.95. T.F.H. Pub., 211 West Sylvania Ave., Neptune, NJ 07753.



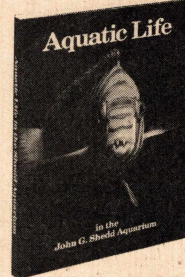
Underwater Man—This revised edition of Dr. Joe MacInnis' book recounts the author's adventures from treasure hunting, through deep diving in a submersible, to the search for the *Breadalbane* wreck. \$9.95. Panorama Pub. Ltd., 3732 W. Broadway, Vancouver, BC V6R 2C1.



Australian Scuba Diver—By Hugh Morrison and Steve Sinclair, this book attempts to standardize theory (in Australia) at the level of the National Qualification System, Scuba Diver Award. \$8.12 (Aust.). Lion Fish Pub., 281 Wanneroo Road, Nollamara, Perth, W. Australia 6061.



Corals of the World—By Dr. Elizabeth M. Wood this book is a manual on reef building corals of the Atlantic, Pacific and Indian Oceans. The genera are described by both skeletal and living characters. 250 full color photos. \$29.95. T.F.H. Pub., 211 West Sylvania Ave., Neptune, NJ 07753.



Aquatic Life in the John G. Shedd Aquarium—The aquarium, in Chicago, houses a multitude of aquatic life. Animals are discussed including organisms from coral reefs, swamps, rivers and lakes. \$6.95. John G. Shedd Aquarium, 1200 S. Lake Shore Dr., Chicago, IL 60605.

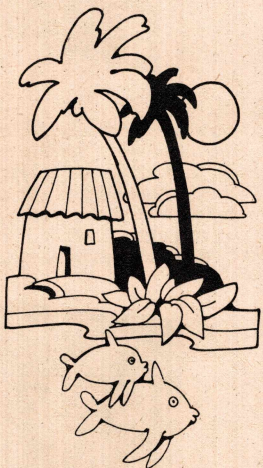


Cooking Conch—By Nixon Griffis, John Clark and Catherine Lochner Clark, this book includes ecological information and recipes for this marine gastropod. The proceeds go to programs for conch preservation and farming. \$5.95. Griffis Foundation, 29 East 61st St., NY, NY 10021.



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PENNEKAMP STATE PARK CONCESSION Box 13M, MM 102.5, Key Largo, FL 33037 The only dive shop located directly in Pennekamp. Free brochure, send 50c for reef chart.	305/451-1621 800/432-2871
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DON'T TRADE ABS UP

An article entitled Hunt for the Giant Abs in the October SDM mentioned that "Often a sport diver will take a lim-it... and then 'trade up,' replacing abalone already taken with larger ones." While the author and SKIN DIVER don't condone this practice (the author called it a "problem"), it wasn't made clear in the article that this is actually against the law. The 1984 California Sport Fishing Regulations (page 8, Mollusks, 29.15) state that, "All legal size abalones detached must be retained and a person shall stop detaching abalones when bag limit is reached." There are two versions of Fish and Game Laws; the condensed form-California Sport Fishing Regulations, 1984, A Summary—does not contain the regulation on trading up. Be aware, however, that this is illegal. Help conserve our natural resources by following Fish and Game regulations. ➤

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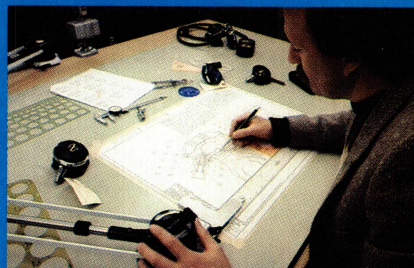
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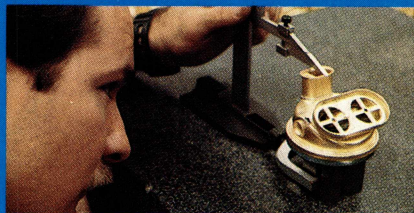
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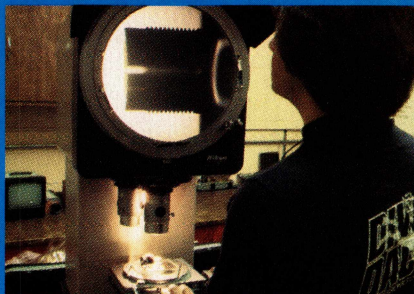
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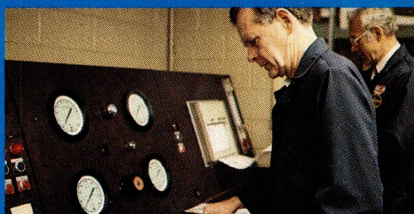
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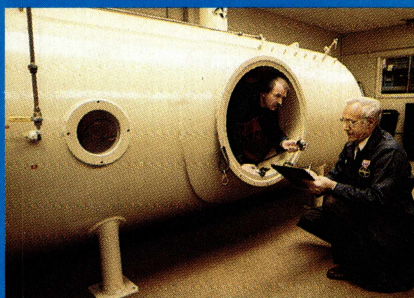
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